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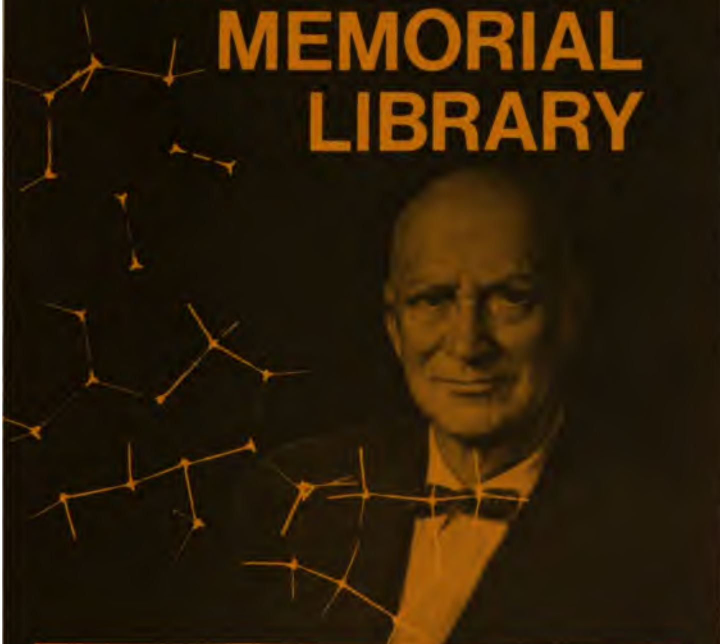

INDUSTRIAL RESOURCES

OF

WISCONSIN.

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MILWAUKEE;

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TO BE PUBLISHED MONTHLY;

Or oftener, if circumstances permit.

The Entire Work to contain twelve numbers of thirty-six pages each. The whole, when completed, to be accompanied by a

MAP OF THE STATE.

PRICE PER NUMBER, 10 CENTS,

NOTE.—Booksellers and parties wishing to become subscribers, or agents for the work, will please to address the author by letter, post paid.

CHICAGO:

LANGDON & ROUNDS, BOOK & JOB PRINTERS,

43 LA SALLE STREET.

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1853

PREFACE.

Three or four writers have already brought the young state of Wisconsin under public notice, every one of whom having contributed more or less to its advancement, by pointing out the many peculiar advantages it affords for a home to foreigners, and eastern farmers and capitalists, as compared with any other of the Western states.

The works of my predecessors have answered all the purposes for which they were written. However the celerity with which the state is advancing—the rapidity with which new towns spring up, and dense forests disappear—the facilities of communication, by land and water, which are daily multiplying in every direction—the spread of knowledge resulting from institutions recently established in many parts of the state—the number of new towns and counties organized every year—the magic change effected in the brief space of every successive year, in every department, demand a new hand book almost every year. The present work however, though answering all the purposes of a guide to immigrants, seeks a more permanent place in the archives of the country, and a wider sphere of usefulness, not only to the present generation, but to generations yet unborn. Nature works under certain laws, which never cease to act, and in which time effects no change. The soil, physiognomy, climate, and every natural product and advantage, placed by providence at our command in the state, are all the results of those laws, a knowledge of which enables us to convert them to our own use and benefit. Nature supplies us with the raw material, and knowledge and industrial ac-

tivity enable us to manufacture it into a thousand different forms to supply our wants and administer to our comforts. One of the chief objects of this book, therefore, is to point out all the natural advantages and industrial resources of this state, and show how to convert them to the best purposes for the general advancement of its people, in all those departments of industry best calculated to make them independent, and elevate their condition in the scale of society socially, morally, mentally, and physically. The part of the work devoted to this subject, cannot be considered ephemerial, the objects discussed being in their nature enduring, and the discussion universally applicable. The discussion of a subject embracing such a wide field, necessarily involves the consideration of many distinct problems. All, however, are linked together, in close connection, so as to form but one continuous chain, connecting the prosperity of Wisconsin with its industrial resources. Besides a wide range of statistical information on all matters connected with the state, derived from the most reliable sources, the work contains numerous discussions of the geology, meteorology, climate, and other natural conditions and phenomena observable in the territory; of its soil, natural products, botany, and natural history; of its agriculture, trade and commerce, harbors, and navigation; of its lakes, rivers, prairies, and forests; of its water power, fuel, machinery and handy-craft trades; of its rail, plank and common roads; of its colleges, schools, churches and other institutions; and of every subject which legitimately comes within the scope of such a publication. In treating these subjects, numerous others are incidentally introduced, as growing out of, or directly bearing upon, the particular subject under discussion, such as the exemption laws of the state, free trade and tariff, public works, &c. All the towns and villages, with the surrounding districts, are described. The work concludes with instructions to immigrants. In conclusion it may be necessary to state that the work was commenced nearly three years ago, when the condition of the country was different from what it is at present: therefore any statement that might have been made, as then applicable to to the state of the country, has been altered when necessary in a subsequent part of the work, so as to answer the altered condition of the country. To make myself thoroughly acquainted with the

state, I traveled through it in different directions, and also through large portions of the surrounding states in order to gain information respecting the geology and other subjects connected with Wisconsin. From the variety of subjects it embraces, and the attention paid to the wants and wishes of different classes, who may be desirous of information respecting this state, as well as of many who may read the book merely with the view of gratifying their taste or passing away an idle hour, I hope the work will be found to contain much that may suit all. The laborer, the mechanic, the manufacturer, the agriculturist, the miner, the geologist, the philosopher, the antiquarian, the naturalist, the political economist, and the general reader will find something in the work that may interest and please him: at least I have written it with that view. In discussing several of the subjects introduced into the following work, frequent allusion is made to the old country, with the view to institute a comparison between the existing conditions of both countries. Such a comparison is necessary inasmuch as the work is intended to be circulated, through England, Ireland, and Scotland, as well as through the German States, when a correct translation into the German language shall be completed.

I may have set forth some views of my own, not in perfect accordance with those entertained by others, but as I allow others perfect freedom of thought in speculative matters, I claim for myself the right of expressing my own peculiar opinions, which I do with due deference. With sectarian or political opinions I have nothing to do, and therefore wish it to be distinctly understood that whereever the subject may seem constructively to bear on these matters, I have reference solely and exclusively to the social and moral condition of the state.

INDUSTRIAL RESOURCES.

CHAPTER I.

Our people are accustomed to speak of our prosperity and greatness, in language which may seem to deal too freely in hyperboles; but notwithstanding a temporary depression felt at present, (1850) arising from causes which time will remove, and which are explained in a subsequent chapter of this work, I can assert from personal knowledge, as well as from the concurrent testimony of travelers and the press, that no country or state has perhaps ever advanced so rapidly along the path of improvement and civilization, as Wisconsin. I am not to be understood as including large accumulations of money in the march of progressive improvements, though I could point out many that have amassed considerable fortunes from the legitimate pursuits of trade and commerce, as well, as from the yearly increasing value of real estate. In a new country where land and labor must necessarily form the chief capital, money cannot accumulate rapidly in the rural districts; but with the daily increasing amount of labor now crowding in upon us from every point; the unequaled fertility of our soil; the salubrity of our climate; and the facilities of intercourse, both internal and external, which are every day multiplying around us, the reality far exceeds the most glowing terms that can be employed in its praise.

A few years ago, the dark and silent forest; the green rolling prairie; the crystal waters of its thousand lakes, and as many murmuring streams and rivers, served only to feed the agile deer, the unweildy buffalo, and the roving tribes of naked Indians, that claimed this wild, but beautiful region, as their inheritance.

But now a different state of things is visible. Now an ocean of waving crops of golden hue, occupy the place of the gloomy forest; and the bustle of the busy reaper, the merry prattle of the light hearted maid, and the gladdening accents of the farmer's family fill the air, banishing its wonted silence, and giving the whole scene around, an aspect of industrial activity, cheerfulness and joy, which cannot be equaled in any country burdened with rack-rents, taxes, poor rates, and a thousand other charges calculated to dishearten the people, and leave no hope of improving their condition. The tens of thousands of horned cattle that graze in contented and lazy luxuriance on the boundless prairies, have banished the unwieldy buffalo to the Rocky Mountains, and the march of civilization which seems to keep pace with the sun as he rolls westwards chasing the gloom of night, has driven the red man beyond the father of rivers. The lakes and rivers visited only by the buffalo and Indian, when the cravings of appetite urged them thither, are now covered with fleets of steamboats and sailing crafts, bearing the produce of this golden region to the ocean, and returning laden with the luxuries of distant climes. The monotonous aspect of the rolling prairie is broken and enlivened by numerous cheerful dwellings with which it is dotted here and there, among cultivated fields of various hues, and luxuriant pastures of the deepest green, stocked with cows, horses and sheep,

which add life and animation to the scene. The silence of the lonely lake, embosomed between sloping heights and frowning bluffs, covered to their top with the towering monarchs of the forest, and with the more humble, but not less beautiful tribes of evergreens, which add grace and beauty to the prospect, is broken by the incessent stroke of the hammer, the clattering of the mill, and the snorting of the steam engine, giving motion to machinery of various sorts; and by the multitude of busy citizens that people the new city, which has sprung up, as if by magic.

The ample river, whose silence was broken only by the murmurs of its own waters, as they glided along, having invited the industrious multitude to settle on its banks, towns and villages, with saw and grist mills, stores and lumber yards, workshops and private dwellings start into existance in a single year.

Hereditary titles and the law of entail have been productive of much evil in the old country, elevating one branch of a family, and depressing the other, merely with a view to create and perpetuate an aristocracy in the land, than which nothing could operate worse on the general frame of society. This remark is strikingly illustrated by the state of society in Ireland, where the descendents of the same parents are socially as far asunder as the poles. If personal merit deserves titles, I have no objection that, under a monarchical government, they should be conferred on him who gained them; but his heir by law, who perhaps may be an idiot or wicked man, has no personal right to them. If intellectual talent or industrial activity accumulates wealth, the owner has a perfect right to enjoy it to an unlimited extent, but as the laws of nature dictate no preference of one

child to another, the father who leaves one child rich and all the rest poor, violates a natural law, proceeding from the fountain of justice. He does more, he lays the foundation of an evil which separates the people into distinct classes, making the millions poor and dependant, and the tens wealthy and exclusive. We cannot see these remarks fully illustrated in this free republic, where equality, the natural birthright of man, is acknowledged. In Ireland, (and perhaps I might include England and Scotland too, but not in the same degree,) they are exemplified to the very letter. In Ireland the few are rich, and the many poor. This state of things will induce thousands to quit that country which affords neither position in society, nor the means of comfortable existence; a country whose vital powers are wasting away under a disorder which yields to no external application; a disorder which affects no self cure; a disorder which seems irrestible in its progress, to effect evil in every department, and among every class; a disorder consuming all the available resources of the country; reducing even the land lords to a state bordering on destitution, and obliging many to abandon their land altogether, from inability to fulfill its liabilities; the poor rates, with other charges, in many cases, exceeding the available receipts. Under such discouraging circumstances, how thankful should they be to the Supreme Ruler of all nations, for having provided for them, as well as for the distressed of all other European na-nations, a safety-valve by which to escape, a home to shelt-them, and a land to feed them. Let them therefore not hesitate to come where a demand exists for labor; where land can be had cheap; where the law knows no class; where situations of honor and trust are open to merit; where

it may be said that every one has a vote which virtually goes to make the laws by which he is to be governed; where the exemption laws secure a home to all whose labor may have acquired it, a sacred spot of free earth which he can call his own, a spot which will be an asylum in times of adversity, from which the wife and children, old age and infancy, can still draw sustenance, and claim protection, though misfortune may rob them of all else, and then feel that they are still free, still entitled to walk the green earth, and breathe the free air of heaven "in defiance of power and potency of accumulated wealth, and the domineering hateaur of the ambitious." I should be sorry it would be supposed from this quotation, that I am for limiting the accumulation of wealth, by individuals; as that would be checking private enterprise and the legitimate exercise of individual activity. I am well aware that many good men possessing great wealth feel convinced of the truth, that, "wealth has its duties, as well as its rights." To such persons, the quotation does not apply. To return to the subject of homestead exemption, the law which exempts forty acres of land, with a house and all its appurtenances, from execution, secures a home for every family, whose honest labor may have obtained it, against the weakness, the vices, or misfortunes of the father, riveting the affections of the child, in years of manhood, by a stronger tie than any consideration that could exist, and imprinting on his memory, in characters never to be effaced, the stream upon whose flowery banks he had played, and in whose limpid waters he had bathed, often in thoughtless insecurity; "the favorite spot where he had gamboled in the innocence of childhood; the family altar where he felt a mother's love, and bent the knee in youthful obedience to the will of his

Maker;" the green spot containing the ashes of those he had once loved; every hill and hollow; every plant and flower; every shrub and tree; and every object however trivial, occupying a place on the farm which contains his home. Besides a house and forty acres of land, the law of this state exempts from execution or sale, the family bible, family pictures, school books and library, a seat or pew in a house of public worship, the rites of burial of the dead, all wearing apparel; all beds and bedding; all stoves, cooking utensils and furniture, not exceeding $200 in value; two cows, ten swine, one yoke of oxen and one horse; ten sheep, all the wool from the same, the necessary food for all this stock for one year, one wagon, cart, or dray, one sleigh, one plow, one drag and other farming implements, not exceeding fifty dollars in value; provisions for one year, fuel for one year, tools and implements, or stock in trade of any mechanic, miner, or other person, used for the purpose of carrying on his trade, not exceeding $200. These are exemptions which place us here beyond the reach of abject poverty, or absolute want. Contrast these privileges, and the freedom of our institutions with the farmer's present enjoyment or future prospects in Ireland, and the question arises how any one could remain there? Here the Irish exert their latent energies and throw off the slothful habits produced by a worn out system of society, and numerous other causes operating for centuries. Where no prospect of improvement is seen in the distance, we rest satisfied with our present condition, however low—just so in Ireland; but the prospect of reward sweetens labor and stimulates to exertion, as is fully proved by the laborious exertions of the Irish in executing our public works. At home the Irish get no remuneration for their

labor, here they are highly remunerated. Therefore if the Irish are charged with the sin of idleness at home, they can assign a reason sufficient and ample. The government of this country could not advance the interest of the state more effectually than to hold out still greater inducements to foreigners and others living in distant states, by giving all the disposable land in the state, free to actual settlers, charging only the bare expense of the survey and transfer. The more rapid our growth in population, the sooner will all our industrial resources be fully developed. The sooner we fill our state with strangers, the sooner will they be taught to adopt our habits, and comply with all our modes of action. The soil constitutes the raw material, which, while unwrought is worse than useless, but under the operation of labor, becomes national wealth. Our own natural growth, unassisted by foreign immigration, would require ages to supply sufficient labor to till the ground, and raise from it all it is capable of yielding. Therefore it is the interest of all, to induce foreigners to settle among us; notwithstanding the opinion of a few, possessing strong Native American feeling, to the contrary. The sooner, too, on another account, we fill our state, the better: as though the daily influx of strangers, may be considered as a means of improving the manners of society, yet the history of the human race shows that no real progress can be made in the elevation and refinement of a people, till they settle down and cease to be migratory. A tree must plant its roots deep in the soil, before its branches can ascend in symmetry towards the heavens, so it is with a government, which must plant the love of its institutions deep in the hearts of its people, before the nation can ascend in majestic beauty towards perfection

and permanency. Natural elements, heterogeneous in character, cannot settle down into a state of quiesence till the process of effervescence, which takes place from their admixture, is over: so is it with a population like ours, composed, as it is, of heterogeneous masses collected together from every quarter of the globe. The "gaseous discord" generated by the admixture of different habits, customs, passions and feelings must get time to escape, before a society composed of such jaring elements can settle into a state of permanent quietude. For this reason, the sooner we fill the state, the better. But though these elements may jar for a moment, like different metals in the furnace, yet the amalgamation of the races, by intermarriage, must produce the most perfect race of men that has ever appeared upon earth. The metal is purified in the furnace by banishing all its impurities in the process of fusion, and combining by natural affinity the remaining refined materials; so is it with races, not only of men, but of all the inferior animals, which are invariably improved by crossing the breeds. This view of the case holds good in the vegetable kingdom also. By grafting on the wildest crab tree, the most delicious fruit is in time produced. The history of the world proves that races of an improved character are invariably produced by the fusion of different races. The surprising races of the old world were the offspring of such fusion, and no doubt all the powerful nations of Europe were, from time to time, reconstructed, by the amalgamation of different races, and the more heterogeneous the elements, of which they were composed, the more powerful the race. Hence, I argue that America, at no very distant period, must produce the most perfect race of men, both as regards intellectual and physical powers, of any people, either of ancient or modern times.

Long indulgence in ease and luxury, and the intermarriage of noble families, for ages, to prevent the intermixture of plebean blood, have led to the degeneracy of many of the old nobility of Europe, both mentally and physically. Thus impaired in mind and body, and their overgrown hereditary fortune ruined by long indulgence in extravagant habits, many of the nobility improve their condition in every respect, by marrying the daughters of wealthy bankers ,manufacturers, or merchants. Such alliances have invariably tended not only to improve the worldly condition of the noble spendthrifts, but also, by the infusion of new blood, derived from a class kept in a healthy condition, by temperance and industrial activity, to revive the exhausted faculties of the mind and body, and thus prevent the approach to idiotcy, and in many cases, to the total extinction of numerous families. Nobility always originates in worth, but very often ends in degeneracy. Original titles are only conferred on men of talent and public usefulness; but hereditary titles and wealth, frequently lead to intemperance, imbecility and total extinction. No such result can arise in such a republic as ours, where the law of primogeniture is unknown—where industrial activity, and individual worth alone can expect to be rewarded—where the portals leading to every post of honor and emolument are thrown open to all, irrespective of class, creed, or station—where industry and labor are always rewarded, but never disparaged—and where every man must live by the sweat of his own brow.

At present, whatever industrial activity exists in Wisconsin is distributed along the Michigan and Superior lake shores, along the Mississippi river, through the mining regions, and along the navigable streams on which the lumber trade is

conducted. The pineries from which we obtain the enormous supply for home consumption, and for distant markets, mentioned in a subsequent chapter, exhibit a scene of industrial activity, of which no one, without seeing it, could have any conception. But with these exceptions, and the newly constructed rail and plank roads, the work which employs the bulk of the rest of our population, is agriculture, which in places inaccessible to markets, is not remunerative, but very much so, in places where produce can be disposed of. To extend the sphere of industrial activity, and distribute its manifold advantages among all classes, good roads are indispensable. At certain seasons of the year, many of the common roads of Wisconsin, as well as of other western states, are impassable: therefore plank roads ought to be constructed where want of sufficient capital precludes the possibility of building a better. Even in seasons when our common roads are passable, the expenditure of power in drawing a given weight on them is very considerable, as compared with that required to draw the same over a plank road. It is computed that to draw a ton weight on an ordinary common road, requires a pull of one hundred and forty-seven pounds, and to draw a ton on a plank road, requires only a pull of twenty-three pounds. The first step towards civilization and national prosperity is facility of intercourse, as afforded by good roads, and therefore, while the capital invested in such public improvements have, in most instances, remunerated the projectors, they have established a just claim to public gratitude. Next to the means of instruction, facility of intercourse tends most to improve the condition of a people. Plank roads radiating from every town in the state, would effect a saving in the single article of fire wood, equal to the

expense of construction, not to mention the various articles of produce, which every town requires for its consumption, I must again repeat, that we must regard those as the best benefactors, who open up the avenues leading the richest resources of the country, placing at the very doors of the inhabitants of every district, the means of the most perfect access to markets where they may dispose of, or barter their spare produce, either for cash, or such necessaries as they may stand in need of.

What plank roads are to a district, rail roads are to a nation. Plank roads develope the industrial resources of a district, rail roads develope the industrial resources of a nation.

The superiority of a rail road over any other, even the most perfect in England, is too manifest to admit of rivalry; possessing, as it does, unlimited means of accommodation, either for the rapid transmission of any amount of merchandize, or of any number of passengers, with whom time is in general, an element of profit, entering largely into every transaction in which the traveling public are engaged. Rail roads have proved of such paramount advantage in England, that they have superceded the best common roads in the world, banishing the mail coaches, and all other public conveyances whatever, and giving to the nation a degree of commercial and manufacturing superiority, which she never could have attained to, under the old system of traveling, for which she had been so justly celebrated. When rail roads have conferred on England, a mere cabbage garden, such commercial advantages, what must their effect be on the interests of America, remarkable for the extent of its territory; the variety of its natural products; and the

traveling propensity of its inhabitants. When English rail roads pay a handsome per centage on the outlay, what must not we expect from capital invested in American rail roads, The engineering difficulties in England, the vast sums demanded for the right of way, the lavish expenditure of capital in obtaining a charter, and the enormous expense of unnecessary embellishments, all tend to diminish the profits of the stock holders. In Wisconsin, at least, companies undertaking to build rail roads have none of these to contend with; their profits therefore, must be proportionably large. If capitalists in wealthy England were aware of these facts, they would gladly loan on railroad security in Wisconsin, getting what is unknown there, a large percentage on the very best security. If capitalists in England were aware of the extensive field open for them here, for the secure and profitable investment of money, at five or six per cent; their spare capital need not be abegging at home at two per cent. Having made this digression, I shall notice a few of the circumstances under which we exist, as regards our position, our capabilities, and our prospects from rapid intercourse, with every part of the state, as well as with every state in the Union. Commercial travelers in the large manufacturing towns in England, find it their advantage to fly to their customers removed from them but a short distance, comparatively, to take or solicit orders for their cutlery, their plated ware, their broad cloth, their crockery, their calico, and such other articles as they may have to dispose of. A few hours would be sufficient to bring them, by well appointed coaches, on the best possible roads, to the most distant out posts, where they did business: therefore the saving of time, by going in a rail road car, could amount, at the utmost, but to a few hours.

What is this minute saving of time in pursuit of customers to purchase a few routine article of manufacture, useful no doubt, and indispensible, in their way, when put in competition with the great moral revolution that must necessarily result from a system of railways in Wisconsin, in connection with others leading to the most distant parts of the Union. The vast extent of America gives her all the necessary products of the whole world, except tea, and that too can be propogated in some of the southern countries, by proper and judicious management. Situated somewhat midway, (for in America a few hundred miles make little difference,) between the broad Atlantic and the still broader Pacific ocean, Wisconsin, by means of an extensive system of railways connecting these shores, and connecting Spitsbergin with Cape Horn, may exchange her various and abundant natural products for the manifold luxuries of every clime. It is in such a vast spread continent, connected together by a net-work system of railroads, that a saving of time, to some amount, can be effected. Such a system of railways will have the effect, not only of saving time, but also of extending commerce, spreading civilization, breaking down differences of long standing, removing antipathies, many of them merely imaginary, and of bringing about a moral revolution unequaled in any country on earth. All this may appear fanciful; but every day brings to light some reality more wonderful and dazzling than the wildest immagination of our fathers. The most marvelous fairy tale to which I often listened, in early childhood, with trembling delight, were but mere shadows, when compared with what we see now, the realities of daily life. The wooden horse that bore his rider on his journey, by turning a pin, is but a feeble

emblem of our iron horse, breathing fire and cloud, sweeping by with the roar of a tempest and the speed of an eagle in his irresistible career. Water this mighty horse in the morning, in our crystal lake, feed him in the woods, and at noon he shall slake his renewed thirst in the turbid waters of the father of rivers; and in the evening refresh himself on the banks of the briny waters of the great Pacific. This iron horse, the creation of a master mind, fed upon the antagonistic elements, fire and water, is destined to draw together into close intimacy, all the families of the human race, by annihilating time and space. The magic gem whose change of color told the fate of a distant friend, or the enchanted mirror that revealed to the heroine the form of her lover, are more than equaled by the spells of the modern application of science. The Daguerreotype fixes on its polished surface the invisible ghost of the passing picture, and evokes it to sight. The electric telegraph not only warns, but discourses, by printing its message. The thief has scarcely time to pocket the stolen purse, before he is gazetted at the most distant point of the nation; and the amorous lover has scarcely procured a cab to convey his fancied prize to the next railway station, before the bands are forbidden at "Gretna Green." One man tamed the subtle fluid, and another taught it to speak. Nothing could afford a more practical illustration of the wonderful rapidity with which news is transmitted through every part of this wide spread country than was afforded by the last Presidential election. The ballot box was closed with the setting of the sun, on the day of election, (2d November,) in every town and city throughout the Union, and before the inhabitants of Milwaukee had retired to rest, the telegraph wires brought the news of the vic-

torious party. Look to the length and breadth of this Union, count the thousands and tens of thousands of cities, towns and villages spread all over it in every direction, and then consider the achievements effected by the modern application of science. Is it not wonderful? What has effected all these modern wonders? knowledge, who then will deny the wise saying, that "knowledge is power." Fully persuaded of the truth, that knowledge is power, the wisdom of American legislation has provided every class amply with the means of acquiring useful knowledge, which cannot fail to diminish crime, promote virtue, banish superstition, make all our citizens more useful, and better members of society, and add to the amount of national happiness. The glistening domes of our palaces of education bear ample testimony to the stranger, as he approaches the queen city of the lakes, that our rulers have not been unmindful of our intellectual culture. Every ward in our city has its beautiful and ornamental building, in which the rich and poor of every class, religion, and creed, can sit down together, side by side, and receive instructions in such useful branches of education as are calculated to promote their usefulness, as men and citizens. Nothing sectarian or political should make its way to that fountain from which all are to imbibe useful knowledge. Let all come together and draw from that fountain the knowledge which fits them for the world and makes them useful citizens, and from their respective clergy and parents, the knowledge which fits them for heaven. In a system of mixed education, useful knowledge bearing on the ordinary affairs of life and morality, should alone be taught in schools. Nothing tends more to sour the mind, engender a lasting hatred, and keep up sectarian feuds,

than to educate the youth apart, and poison their tender minds with the noxious seeds of religious bigotry, which never fail to grow to maturity in rank luxuriance, under the fostering care of contending parties. Away with that hateful cant, which has so long retarded the progress of education in Ireland, and inflicted upon that unfortunate, but beautiful country, more lasting injuries than the potatoe blight itself. No impression is so lasting as those of early life—no sentiment so enduring. The lessons learned in early childhood are retained in old age, while those learned in mature years are sometimes soon forgotten. There is no friendship so pure, so liberal, so lasting as that which springs up in early life at school, in young hearts contending for the literary and scientific laurels which, in after life, add dignity, honor and renown to the brow that wears them. With what fond recollections do we dwell on the scenes and incidents of our school-boy days. Why then should children be separated at an age when the tender mind is susceptible of forming the most lasting and ennobling sentiments of our nature; such a separation is the begining of a lasting hatred, forming a line of demarkation which can never after be broken down. While I am anxious to inculcate liberal principles, by breaking down those barriers which separate sects, I am equally anxious to keep places of education free from anything bordering on an unfair system of proselytism, which oftener springs from hatred than love. This is a digression which I had not intended, growing out of the superlative importance of the subject—knowledge, the evidence and fruits of the diffusion thereof are more visible, and practicably ilustrated, throughout this country, than perhaps in the most enlightened parts of Europe. In a subsequent chap-

ter, I shall resume the subject of telegraph lines, in detail, as also that of rail, plank and common roads, showing their relative usefulness, as means of transit. Aware that this work will be extensively read in the old country, I feel anxious to point out in general terms the advantages of this country over any part of the old country, as a home for persons able and willing to work. In this country, no one has occasion to beg. All have peace and plenty. It is not too much to say that the masses are better fed, better clad, aud more comfortably lodged in America, than in any part of the known world. The laboring man lives well, dresses well, and sleeps comfortably. Though nothing is had here without working or paying for it, yet the means of support is so accessible that no one feels apprehensive of want; and though all seem anxious to accumulate wealth, I never heard a parent express the smallest anxiety, as to the future prospects of his offspring. This also arises from the known fact, that boys and girls, at a very early age, can provide for themselves, and are known to do so, at an age at which English or Irish children could not be entrusted with the delivery of an ordinary message. The anxiety of parents in the old country respecting the future prospects of their offspring, arises solely from the difficulty of providing for them. There a numerous family is a burden, here it is a certain source of profit. There the hardest working laborer can never possess a permanent interest in the soil, or even live in comparative comfort, here every such laborer can live in comfort and spare, in a few years, a sum sufficient to purchase real estate, which descends to his children; there a poor man has no vote, and therefore has nothing to do with the forming of the laws, by which he is governed; here every one has a

vote, and the law requires no property qualification to entitle even the poorest man to take his seat among the legislative assemblies entrusted with the framing of the laws by which the nation is governed. The prosperity of the country is a positive proof of the wisdom of the laws, and the condition of the treasury is sufficient to convince our people that those at the head of the different departments of the state, discharge their respective duties with the most scrupulous regard to economy. Labor, under equitable laws, is the foundation of wealth, and no doubt, our prosperity and wealth are, in some degree, owing to the freedom, wisdom, and liberality of our national institutions, as well as to the productive industry of our people. We live in an age of progress, and it is not too much to say that we are, emphatically, a nation of progress. In the old country, a man will suffer considerably before he engages in any branch of trade or industry below his former station, from which he may have been removed by the force of circumstances, over which, perhaps, he had no control; here every man may engage in any useful pursuit according to his taste or inclination, without the slightest fear of loosing his position in society, or being looked down upon, or slighted by his wealthier neighbor, in whose favor he rises in proportion to his industry and labor. Here no occupation is considered degrading which provides the individual with the means of self-support; in the old country, it is not so. Here the idler, only, is dis pised; in the old country family connection is a license for idleness.

The political and social condition of all new countries pro mote a degree of equality, which influences the manners of the people. To a person accustomed to rank in a higher

grade of society, the freedom of persons below that grade, is far from being agreeable, at first; but in a republic, where the laws of the constitution make no distinction, or confer no privileged rights, every man naturally considers himself as good as another. This freedom comes with a good grace from all educated persons, but with no relish from the uneducated, who generally mistake freedom for obtrusive forwardness; persons of good common sense however, knowing the common right of all to equality in a free country, will make due allowance for the absence of those personal acquirements, which alone can render men acceptable to all classes. Distinctive rights, else than those confered by personal merit, can never promote the welfare of a new country; and though personal qualities, resulting from early habits, education, and good society, as well as from superior skill, talent, or honesty may be disregarded by the vulgar, yet time must enforce the claim of such qualities and endowments to the universal respect of all classes. At present, in this country, as well as in all other new countries, the great and paramonnt object of every individual is, to procure the actual necessaries of life—food and raiment. Here, it may be assumed, that there are no proprietors who can let their lands to tenants, at a yearly rent—no large fortunes accumulated, except by a few traders in large cities: therefore the only means at our immediate command, by which to procure the necessaries of life, is labor. Hence it is, that manual labor is so much valued and so highly rewarded. Hence it is also, that intellectual acquirements are so little valued, and so badly rewarded. This is the natural result flowing directly from the actual existing circumstances of the country. Another result flows from the same cause, namely, that skilled labor is

neither valued nor rewarded, as compared with unskilled labor. From this view of the case, and this view is founded on facts, we can easily see why the professors of science and literature in our colleges, authors, editors of newspapers, ministers of religion lawyers, physicians, painters, civil engineers and architects are so badly paid in this country, as compared with similar professions in Great Britain and Ireland. This state of things has a tendency to retard the progress of national refinement and intellectual improvement: as without a prospect of adequate pecuniary reward or personal honor, there can be no inducement to bestow time and mental labor on these branches of art, science, and literature, without which, however, no nation can attain to that degree of social perfection, or political power, which it otherwise would, under more favorable circumstances. Time, however, will remedy what is but the natural and inevitable result of causes originating in the peculiar circumstances of the country. Industrial labor will produce wealth, and wealth, under proper direction and control, will produce national refinement. The progress already made in the arts and sciences, as well as in all the departments of social life, by all the older states of the Union, fully illustrates the position I assume, and gives a reasonable hope, that Wisconsin, with all her natural advantages, will follow, close, her older sisters in the march of intellectual and social improvement. Here every one is employed in some industrial branch of labor—here the influence of family or birth is scarcely felt—here there is no dominant sect or church establishment to be paid—here it is not considered a disgrace to work at any trade or calling—here no one is brought up in perfect ignorance—here no one eats the bread of idleness—here also we have colleges,

normal schools, and agricultural societies—here, in short, is a field, wide and ample to afford the means of living to millions! With all these advantages, is it not reasonable to expect, that we shall move forward in the march of progressive improvement, with a rapidity commensurate with our peculiar position. I could cite the concurrent testimony of numerous travelers to prove that "there is much in the elements of our state which superinduces great thoughts—a majesty in our forests, power in our rivers, splendor upon our prairies, and beauty pervading the whole, which enlarges, strengthens, glorifies, and fills the mind with lofty aspirations, noble ambition, independence, and a spirit of love, and universal brotherhood." We are not however to depend solely on our natural advantages. We have rival states, possessing some advantages too, and quite awake to their own interests, to contend with. We ought to look to ours, by "taking time by the forelock." If we rest on our oars, we loose the race. If we are not early in the field, others will be in possession. The streams of industry, trade, and commerce are passing into Chicago, like mountain torrents. The sagacity and enterprising spirit of her citizens have commenced to draw some of these streams from our state, and they will inevitably succeed in injuring our best interests, if we neglect to tap them at their source, and convey them through the legitimate channels of the state. No one can blame Chicago for setting a great part of her commercial machinery in motion by a power drawn from our resources, if we look on with our arms folded and our wheels at rest for want of that motive power which we allow thus to pass away. The Chicago and Galena Railroad will drain the business of the western parts of our state, the projected tributaries to this, having their source at Mineral Point, Beloit, and Janesville will drain

the south, and the Rock River Valley Rail Road will sweep away every thing from Fond du Lac to Janesville, if not prevented in time. The ruinous effects of these roads can only be counteracted, by vigorously building all the roads which have been projected through this state. This would have the effect of directing the stream of commerce to the lake cities of Wisconsin. The necessity of increased exertion hourly presses itself on our citizens, to counteract approaching evils, by taking immediate action on all the projects relating to roads leading to our lake shore cities, and by taking advantage of all the favorable circumstances which chance seems likely to throw in our way. Captain McKennon of the English Navy, grounding his statements on what he considers to be "sound and accurate information, writes that it hasl ately been whispered abroad, that negotiations are pending between the British and American Governments to build jointly a rail road on the boundry line to the Pacific, from the head of Lake Superior, in latitude 49 deg. N. The Canadians being apprised of this fact are pushing their rail roads with "hot haste" to monopolise the trade to lake Superior, and thus get the first chance for all the summer business to those regions."

Some fifty years ago, the great continents that looked across the deep waters of the Pacific Ocean were either barren wilds, or ancient and mysterious empires, without enterprise or signs of life, save and except a few Indians, a stray deer, or other wild animal, reposing without fear on the broad wilderness. The Pacific was then an ocean of pastoral romance; but is now flanked by empires rising in importance with a celerity of progress which has no parallel in the history of nations if I accept what are generally known as the western states. Sydney on the west, and San Francisco on the east, with the Anglo-Saxon empires of which they are

the principal cities, now sway the shores and islands of the Pacific, while their numerous fleets fill its ports with all the luxuries of tropical climes. "China and Japan sealed for centuries against commerce and civilization are about to be forced open by the force of events." The Pacific encircles a thousand isles, producing fruit, spices, and other luxuries, while its sides are guarded by glittering mountains of gold, which allure thousands and tens of thousands from every country and from every clime, who hasten thither with breathless anxiety to gather up the perishable dust that lies above, below, and about in every direction. But those seducing golden fields lie at a great distance, which it would be desirable to abridge, so as to make them easily accessible. This will soon be accomplished by the enterprising spirit of the age. Rail roads connecting Lake Superior, the Mississippi, and the Atlantic with the Pacific Ocean will accomplish it. A rail road or canal, or perhaps both, across the Isthmus of Panama, are confidently spoken of. The scheme is pushed forward with an earnestness of purpose which gives hope of its being carried into execution. Congress seems determined to connect the Mississippi with the Pacific, by a system of railroads. This subject is discussed with an earnestness commensurate with the vastness of the undertaking, and there is little doubt of its leading to a successful issue. The connection of Lake Superior and the Mississippi with the Pacific would open to Wisconsin an additional field of enterprise. The Pacific Ocean, to modern enterprise, is likely to become what the Mediterranean Sea was to ancient enterprise. What a wonderful age we live in; science is bringing the most distant parts of the earth into close proximity; and the hum, clatter, and other sounds of industry are daily and hourly banishing silence from the wilderness.

Nature seems to have worked upon a grand scale in all her operation in this great and wonderful country. Our mountain ranges are gigantic—our rivers gigantic— our mineral regions extensive—our coal fields extensive—our prairies vast—our forests vast—our trees magestic—and our lakes like oceans. Our people as if following nature, seem anxious to work every thing upon a large scale—witness the extent of our canals, our railroads, and our telegraphs—witness our expresses, our stage coach establishments, our hotels, our boarding houses, and our machinery—witness our fleets of steam and sailing vessels, our fisheries and our commerce—witness the extent of our states, and the vast machinery of our government, and in view of all, the mind becomes bewildered how all can be accomplished in so young a country, and by so thin a population. When we view the extent of our Union, and the machinery necessary to carry out the laws, exact obedience, and protect life and property—when we consider the enormous amount of duty which devolves upon the different departments of the Union—when we reflect on all these, and contrast their collective magnitude with the small amount drawn from the resources of the country to carry on the public service, have we not reason to rejoice and be thankful. The economy with which the public service is performed is among the many causes, that have, and are still, operating in our favor; by which we are moving along the line of improvement, and extending the sphere of industrial enterprise, with a celerity which defies history to find a parallel. The state of the treasury shows the receipts for the fiscal year, ending 30th June, 1852 exclusive of trust fund, to be $49,728.387; the expenditure for the same period, likewise exclusive of trust funds, being $46,007,896, of which $9,455,815 was an account of the principal and

interest of the public debt, including the last instalment of the indemnity to Mexico, leaving a balance in the treasury amounting to $14,632,136. Compare this expenditure with that of Great Britain, and observe the contrast. The expenditure of that country for the year 1852 was $270,000,000. The expense of the army and navy alone, of Great Britain amounts to $69,000,000—far more than the aggregate expense of our government. The estimate of the naval department of England for 1853 exceed $30,000,000. The sums drawn from the funds of the country to pay the constabulary for keeping the starving Irish in check would appear ludicurous to an American. To acquire information relative to this work, I traveled through four states of the Union last fall, and in all my journey, I did not see one soldier or one policeman.* Compare this with the standing armies of soldiers in Great Britain and Ireland, whose support is drawn from the people, and mark the contrast. Compare the salaries of the judges, poor law commissioners, and other paid officers in those countries with the compensation given to persons filling similar offices here, and mark the difference. But I mistake, we have no poor law commissioner here, nor are we likely to require the services of such an official for some time to come. Compare the sums drawn from the people (for every thing comes from the people) to pay

* It is but common justice to American liberality to state, that in all that journey, I was passed free by Rail Road, Stage Coach, and Steam Boats. Candor obliges me further to state, that in all my travels through this continent, all public conveyances passed me along without charge. To all persons connected with these public conveyances, therefore, I tender my most grateful acknowledgements, especially to Messrs. Davis & Moore, of the firm of Frink & Co., proprietors of the most gigantic stage coach establisment perhaps in the world, and to Capt. Cotton, the prolite and efficient agent of the Michigan Central Rail road.

the church establishment there with what is paid here to Ministers of religion, and mark the difference. Compare the feelings of the people towards their respective government in Europe, with ours towards our government, and mark the difference. And lastly, compare the condition of the people under the different governments in Europe with ours, and the conclusion must be self evident. I write thus not for the purpose, by any means, of finding fault with the laws and institutions of my native country; but simply to show, by comparison, the excellence of those of my adopted country. My doctrine has always been, to submit, with perfect obedience, to the established laws that be. But if the established laws were found to be bad, to remonstrate and petition for their repeal. No party should embarass a government by unnecessary opposition, but all should rise up en-masse to remonstrate and put down corruption. I honor a patriot, but despise a demagogue, whose trade is agitation, but whose object is gain. There are too many patriots of this description in every country, living upon the credulity of the people. The discussion of the laws of England, some of which, if administered in the spirit in which they were made, are, in many respects, perfect models, forms no part of my plan; but as the productive industry of every country, which no doubt, forms the basis of its prosperity and wealth, is closely connected with, and partly dependent on the laws, I mean, when occasion may arise to call attention, incidentally, to the excellence of the Constitution of the United States, which though not perfect in every particular, as partaking of the imperfection of human nature, is nevertheless, the best that ever was formed. It protects life and property, promotes trade and commerce, lends its aid to the improvement of such means of internal communication, as is necessary to promote the general

inter est of the nation, by opening up the great channels of internal commerce, and by facilitating the frequent intercourse of the population. Difference of opinion, however, may sometimes exist, as to the best means, on the part of the government, to promote the welfare of the nation, as regards its commerce, its manufacture, its trade, and other branches of industry, whether mental or material. This difference of opinion is now the subject of discussion between two parties in the Union, the one advocating free trade, and the other a protective duty to diminish competition from abroad. To discuss this subject in all its bearings, would take up more time and space than I can devote to it at present, therefore I shall dismiss it now, and resume it in a subsequent chapter, at a more fitting time.

The next subject which I shall take up presents physical features, no less interesting to those seeking a home in Wisconsin, than to persons at a distance, who may be partial to natural subjects. To new settlers not wishing to encounter the labor and difficulty of clearing the dark dense forest to be seen in many parts of the far west, the natural prairie and oak openings present tempting inducements, which no one who has not seen them could immagine. The oak openings present all the appearance of a nobleman's demesne in England or Ireland, with, often, all the appearance of studied art in the arrangement of the stately monarchs of the forest, which, in general, are at such a distance apart as not to interfere often with the operations of the plough and harrow. These oak openings are sometimes seen on dry table land adjacent to a level forest or prairie. They sometimes occupy sandy ridges running through a prairie. They in general undulate. Some of these natural parks are of excellent quality, most of them affording sufficient wood for

fencing and firing, which are indispensible necessaries on a farm. Wisconsin has a happy combination of prairie, oak openings, and wood land. Prairie land is, in general, of better quality than oak openings. Prairie land requires no grubbing or clearing of any kind, preparatory to the introduction of the plough. When a prairie is rolling and limitted in extent, nothing could be more desirable for the farmer, provided it adjoins woodland. But a flat extensive prairie of many miles presents an aspect, by no means calculated to please the eye, or satisfy the wants of the farmer. We have no such extensive plains however, in Wisconsin. Our prairies are rolling and of limited extent, and the aspect invariably diversified by a forest, an oak opening, or a grove, which in connection with the prairie relieves the eye, and renders the whole scene delightful. But a monotonous expanse, undiversified by hill and dale, and without a single object to look at, may please those who are fond of the sublime, but to me such a scene has no charms. A man standing on the unrufled surface of the broad ocean, and out of the sight of land, sees before him a true picture of a prairie, with the exception of the color. And if the sea rolls, he sees before him a perfect representation of a rolling prairie. Foreigners very generally form very erroneous notions of the agricultural advantages and disadvantage of a prairie. Many of them are of unsurpassing fertility, but from the absence of hill and dale, they are generally destitute of good water. The want of a diversity of surface naturally occasions surface water to accumulate, which from want of motion, becomes unwholesome and quite unfit for human use. In such situations, it is unnecessary to say, that the chance of obtaining good water within a short distance of the surface is very uncertain. The farmer occupying such a situa-

tion generally has to dig for water to a depth varying from twenty-five to one hundred feet, and sometimes more. Should he not have one of these surface swamps on the farm, man and beast must be supplied from the well, which is a labor of no trifling import. Besides this great inconvenience, the want of wood for fencing and firing is an item of expense which he feels year after year. Unprotected from the influence of the Sun in summer, the heat is intolerable to man and beast; and being exposed in winter, the cold acts with unmitigated fury. These are obstacles which the new comer must encounter, when he takes his stand on the broad naked prairie. Some of these objections however, to such a situation may, in time, be obviated, as may be seen in a subsequent part of this work. A difference of opinion prevails, with regard to the origin of these prairies. Some are of opinion that neither tree nor bush ever grew on them since they had been covered by the ocean; but this could not be, as when they are protected, even for a short time, from the annual ravages of the red man's fire, trees spring up spontaneously; why then, as is often asked, does not the soil contain the roots of ancient trees, if such ever existed. The reason is obvious. The Indians, from time immemorial, have kept up their annual fires for purposes of hunting, during which the roots disappear. The small distance to which the roots penetrate the soil in this country, the heat of the climate in summer, the influence of the frost in winter, and the total absence of any anticeptic quality in the soil would, in time, be sufficient to banish all traces of ancient roots. It is a curious fact, that when a prairie is protected from fire, groves of trees soon spring up. It may be asked how the seed comes there, or by what agency is it brought there? The old theory of being brought by the

wind, by birds, or other animals is quite untenable. The trees that generally start into existance are almost invariably some species of poplar, with occasional sprouts of crabb or cherry tree, neither of which may not be found perhaps within many miles of the locality. Either the seed lies dormant in the soil for ages, unable to exercise its natural functions, or the chemical admixture of certain elements produces under the influence of some fluid, spontaneous existence, when a combination of favorable circumstances presents itself. The great author of nature, no doubt, accomplishes every thing, however mysterious the operation may appear to us, in the best, wisest, and most suitable manner. Chemistry shows how dead mineral matter is organised or transformed into living compounds, in the mechanism of plants; and also how plants or vegetable compounds are transformed into the bodies of animals. How the author of nature accomplishes this, it is not my business to enquire. When a stone is let drop, it falls to the ground, and the power that makes it fall, we call attraction; but how this power acts we know not. We can trace many natural laws producing visible effects, though we may be totally ignorant of the first cause or of its mode of action. We know that by mixing oxygen and hydrogen in certain proportions, the mixture will form water; but how it is so, or why it is so, we know not.

As connected with this subject, it may be worthy of notice, that when a forest burns out or decays, a new race of tree, speedily springs up, quite different from the departed growth. When a hemlock forest burns or decays, the growth that succeeds it, is poplar, pigeon cherry, white ash, shumack, butternut, and other trees that shed their leaves every year. White pine is succeeded by oak and hickory. When an oak plantation is cut down in parts of Pennsylva-

nia, spice wood springs up. I was told that a farmer in Ohio, cut down an oak plantation, and a variety of other different trees sprung up, and when these again were cut down, they were soon replaced by maple, which spontaneously sprung up. It is worthy of notice, that when a stream abandons its course, the swamps left behind, give birth to a growth of cotton wood, which indeed, so far as I have seen, seems to thrive best in marshes bordering on rivers or streams. Tamarack is confined to swamps, so far as my knowledge of this country goes. It is stated by Professor Johnson, that when a forest of pines is burned down in Sweden, one of birch takes its place for a while; but the birch is again supplanted by the pine. "On the shores of the Rhine are seen ancient forests of oak from two to four hundred years old, gradually giving place at present to a natural growth of birch, and others where the pine is succeeded by both." The oak and pine alternate naturally with each other in many parts of this country. I have been told by an intelligent gentleman of much observation, that evergreens are invariably succeeded naturally by trees that drop their leaves. What a lesson is all this for the practical farmer, who should always take advantage of the natural operations continually passing before him in the wilderness. By paying due attention to what passes in the forest where Nature alone operates, the alternation of different trees and shrubs, would soon suggest the idea of the rotation of crops. In the wilderness, the soil seems to run out, and thus exhausted and unable to supply the necessary food, the present growth dies, and is succeeded by different species of trees, which grow luxuriantly, the extinct tribe having left an abundant supply in the soil fit for the nourishment of the new race. So is it with the plants which we raise for food.

When the soil ceases to supply the growing crop with a sufficiency of food fit for its support, another should be put into the ground which, though deficient in food fit for the former, may, notwithstanding, contain abundance suited to the latter. The soil contains different descriptions of food for the nourishment of plants, and different plants require different descriptions of food; therefore a succession of the same plants would ultimately exhaust the soil of that food on which it lived. Hence the necessity of a judicious rotation of crops. A poor soil without artificial manure and labor never produces a heavy crop, of which the practical farmer is well aware. The soil may be easily judged of by the crop. It is just so in the forest. When the trees are stunted and scrubby, the soil is seldom good; but when the growth is large and healthy, the soil is generally good. One accustomed to the woods would tell at a single glance, the quality of the soil, by the appearance of the trees, as well as the species. This subject, which I mean to resume in the chapter devoted to agriculture, has naturally grown out of the cause asigned for the origin of our prairies, which is the annual fires of the Indians for purposes of hunting. The prairie fires, when the grass is long and thick, present some of the grandest and most terrible scenes in Nature. When the grass is dry, and the wind favorable, these fires spread with a fearful rapidity, rushing along with a noise like thunder, emitting clouds of smoke, banishing every quadruped, bird and creeping thing, and sometimes putting the unweary traveler in terror of his life; who, to escape from the devouring element, sets fire to the grass around, and taking his stand in the burnt part, escapes the approaching flame. Nothing is more dismal than a vast burnt plain, veiled over with a black pall, as an emblem of

death and destruction, presenting not a single object, or sign of life. This bleak, and black, and mournful expanse, however, like the fabled Phœnix, soon revives in all the vigor of youth, robed in the liveliest green of returning spring, and decked with flowers of a thousand hues, giving the entire plain an aspect of cheerfulness and delight, calculated to elevate the soul, and inspire it with a hope that after having performed its pilgrimage in this dark and dreary world, it will, at the resurrection, be raised again decked in glory. How different in their application are these prairie fires. The Indian kindles the fire to prepare for hunting; but Professor Espy kindles the flame to bring down rain from the heavens, with the view to promote vegetation in seasons of drought, when the crops intended for man and beast, show visible signs of failure.

By means of the knowledge furnished by Mr. Espy's admirable theory of storms, artificial rains may be produced under favorable circumstances of a high dew-point and a calm atmosphere. Mr. A. H. Jones, United States Deputy Surveyor says, that he performed many experiments in Florida, in seasons of great drought, and always succeeded in producing artificial showers; and that for some years back, farmers, who became acquainted with his experiments. were in the habit of setting fire to the dry grass at the time they planted their corn, to produce rain; and that they generally succeeded; though (this being in the dry season) it is known no rain would otherwise occur. The modern application of science is working wonders every day, which warrants the general belief that the "world is rapidly advancing." In discussing the subject of the natural phenomena of the state, I shall resume my observations on the storms, and on the manner of producing artificial rains, on an extensive scale,

The peculiar circumstances of this country has given rise to various machinery to abridge labor. The farmer far removed from town, where he could receive the services of a tradesman, has often to supply his own wants, by attempting to accomplish what legitimately was the tradesman's business, and being often put to his "wits ends" for want of tools, he frequently hits upon a device that afterwards proves valuable; thus verifying the proverb, that "necessity is the mother of invention." Necessity drives thousands to do and invent many things which, under different circumstances, they never could think of. It was this necessity that gave birth to numerous inventions of daily use in every house in this country. It was necessity arising out of the peculiar circumstances of the country that has suggested the idea of substituting various descriptions of machinery to abridge labor. Though unskilled labor is much higher here than in any part of the old country, yet by the substitution of suitable machinery, articles of necessity and comfort are manufactured here much cheaper than in any part of the old country that I was acquainted with. Chairs, window blinds, sashes, doors, pails, stoves, and numerous other articles of every day use, are sold here for one-half, and in some cases, for one-third what they could be made for in England or Ireland, where labor is so much cheaper.

The scarcity and high price of labor in this country make the use of machinery indispensible. And though this is quite apparent, yet I have heard numbers cry out against the use of machinery, as calculated to diminish the demand for labor, and throw thousands out of employment, who perhaps might be the only support of large and helpless families. But as in the case of free trade, for every one that is injured by the introduction of machinery, hundreds

and thousands are benefited. The thousands of scriviners the art of printing banished from the desk, were but as chaff, when put in competition with the inculculable benefit conferred on mankind by that happy discovery. The improved process of manufacturing nails, reduced all the nailers, already too poor, to a state of beggary; and the power-loom and spinning-jenny drove before them multitudes into the gulf of poverty, distress, and misery. But though large numbers suffered by these innovasions, millions have been, are, and will continue, to be benefited. Every great improvement to abridge labor never fails to cause temporary distress among thc particular class of operatives whose business it performes; therefore, the government of every country ought to provide at once for the support of that class. And though I am sorry to say that the working classes are often allowed to pine away in misery, yet under no circumstance should those great discoveries, which transfer the superintendance of labor from the hand to the mind, be lost to posterity. But as posterity is not likely to do much for the discarded operatives, the government, the manufacturer, and the humane of every class ought to alleviate their distress. I have lived in the great age of discovery myself, and witnessed a fearful amount of human suffering arising from the introduction of improved machinery; but in this country, no such evil is to be apprehended. In Great Britain and Ireland, one educated for a particular trade or a profession is scarcely ever fit for any employment out of that, for which he had been instructed; but it is not so here. Here, one may follow four or five different trades or professions through life, without feeling any inconvenience from the change of one trade, or profession to another. I met an old gentleman in Illinois

who told me he commenced the world as a cow-herd, which occupation he changed for the plough, which again he changed for school-teaching, from which occupation he went to the bar, from the bar to the practice of physic, and thence to the pulpit.

Before I came to America, I was impressed with the justice of England's claim to superiority in every thing connected with machinery, and to the supremacy of the ocean; but every day convinces me more and more, that preconceived notions had led me into an error. For a very long time all nations acceded to England a high degree of superiority over all the maratime countries with which she had any intercourse. Her knowledge of ship building, and her general mechanical skill, were the admiration of the world. This, however, is no longer the case; America now lays claim to the supremacy of the seas, and England acknowledges the right. An extract from a paper read by Mr. Scott, before the Royal Institution, London, does equal justice to his own candor and to American ingenuity. "The subject placed on the list for consideration this evening, has been suggested by the assertion which within a year or two has been so often repeated, that our trans-atlantic brethren are building better ships than ourselves; that, in short, Brother Jonathan is going ahead, while John Bull is comfortably dozing in his arm-chair, and that if he do not wake speedily, and take a sound survey of his true position, he may find himself hopelessly astern. Two questions of a practical nature arise out of this alarming assertion: First, Whether the Americans are really in any respect superior to the English in nautical matters. Second, Whether in order to equal them, we are to be compelled to descend into mere imitations, or whether we have independent ground

from which we can start with certainty and originality on a new course of improvement in Naval Architecture? In the outset I beg permission to say, that I am not one of those who shut their eyes to the praises of our young and enterprising brethren over the water, or view their rapid advancement with jealousy. I beg to express my perfect belief in the accounts we have heard of their wonderful achievements in rapid steam navigation. I am satisfied as a matter of fact, that twenty-one and twenty-three miles an hour have been performed, not once, but often, by their river steamers. To that we cannot in this country offer any parallel. The next point in which they have beaten us was, in the construction of the beautiful packet ships which carried on the passenger trade between Liverpool and America, before the era of ocean steamers. These were the first ships in the world, and they were mainly owned and sailed by Americans.

The next point in which we have come into competion with the Americans has been lately in ocean steam navigation. Three years ago they began. They were immeasurably behind us at that time, but they are already nearly equal to us. Their trans-atlantic steamers equal ours in bad weather and speed. In regularity, they are still our superiors. If they continue to advance at their present rate of improvement, they will soon outstrip us. Next I come to the trade which has long been principally our own—the China trade. The clipper ships which they recently have sent to that country have astonished the fine ships of our Greens and our Smiths. Our best ship owners are trembling for their trade and reputation. Finally, it is true, that Americans have sent over to England a yacht, called the American, which has found on this side of the Atlantic

no match; and we only escaped the disgrace of our not having the courage to accept her defiance through the chivalry of one gentlemen who accepted the challenge, with a yacht of half the size, on this principal so worthy of John Bull, that the Yankee, although he might say that he had beaten us, should not be able to say that we had all run away. Such then at present is our actual position in the matter of ships, yachts, and steam navigation—a position highly creditable to the Americans, and which deserves our serious consideration. I propose to examine a little into the physical causes of the naval success of the Americans; but before doing so, permit me to point out a moral one, which later in the evening you will find to be at the bottom of the principal causes. It is this, John Bull has a prejudice against novelty; Brother Jonathan has a prejudice equally strong in favor of it. We adhere to tradition in trade, manners, customs, professions, humors — Jonathan despises it. I do not say he is right, and we are wrong; but this difference becomes very important, when a race of competition is to be run. These preliminary remarks find immediate application in the causes which have led to our loss of character on the sea.

The Americans constantly on the alert, have carried out and applied every new discovery to the advancement of navigation; while with the English, naval construction and seaman-ship is exactly that branch of practice in which science has not only been disregarded, but is altogether despised and set aside. The Americans show what can be done by modern science, and unflinchingly put it into practice; we show what can be done in spite of science and in defiance of its principles. It appears from the comparison that was instituted between American and English

vessels, that the American ship-builders have gained over the English, chiefly by the ready abandonment of old systems and the adoption of true principles of science, and the most modern discoveries. They have changed their fashions of steamers and ships to meet new circumstances as they arise. For river steamers, they at once abandoned all the well-known sea-going forms, and created absolutely a new form and general arrangement both of ship and machinery. We on the other hand, subject to the prejudice of a class, invariably attempted to make a river steamer to resemble as much as possible a sea-going ship propelled by sails. We were even for a long time so much ashamed of our paddle-wheels that we adopted all sorts of inconvenient forms and inapt artifices to conceal them, as if it were a high achievement to make a steam vessel to be mistaken for a sailing vessel. The first sharp bows which the wave principle has brought to our knowledge, have been adopted in this country with the greatest reluctance, and those who adopt them are often unwilling to allow they are wave-bows, and would feign assert that they always built them so, were it not that the ship lines are able to speak for themselves. The Americans, however, adopted the wave-bow without reluctance, and avowed it with pleasure, the moment they found it to give economy and speed. In like manner, the Americans having found the wave-line or hollow-bow good for steamers, were quite ready to believe it might be equally good for sailing vessels. We, on the other hand, have kept on asserting, that though we could not deny its efficacy for steamers, it would never do for vessels that were meant to carry sails. The Americans on the contrary, tried it on their pilot boats, and finding it succeeded there, avowed at once, in their latest treatises on Naval Architecture, the complete success of the

principle; not even disclaiming its British origin. To prove to ourselves our insensibility to its advantages—they built the America, carried out the wave principle to the utmost, and despising the prejudices and antiquated regulations of our clubs, came over and beat us. The diagrams and models which were exhibited, showed the water-lines of the America to coincide exactly with the theoretical wave-line. In another respect, the Americans showed their implicit faith in science and disregard of prejudice. Theory says and has always said, "sails should sit as flat as boards," we said they should be cut so as to hang in graceful waves. It has always been so; we have always done it. The Americans believed in principles and with flat sails, went one point nearer to the wind, leaving prejudice and picturesque far to the leeward. In other points, the Americans beat us by the use of science. They use all the refinement of science in their rigging and tackle; they, it is true, have to employ better educated and more enlightened men—they do so; and by employing a smaller number of hands, beat us in efficiency as well as in economy." This article does equal justice to the discriminating judgment and strict candor of Mr. Scott, as well as to the undoubted right of the Americans to the supremacy of the ocean, gained no doubt by placing implicit faith in naval architectural science, and by taking early advantage of every circumstance which chance threw in their way. Milwaukee is peculiarly wel circumstanced as regards convenience and materials for ship-building. On the spot may be found the best oak and lumber of every description in the greatest abundance, while the Milwaukee water basin affords excellent sites for building both wet and dry docks. Buffalo, Chicago, or indeed any other lake town, presents no such advantages to

the ship builder in these respects, as Milwaukee. They will, no doubt, be taken advantage of by some enterprising capitalist of skill. I am happy to see that a company is being formed to build six propellers of the largest class, which are to be employed during the approaching season (1853) between Milwaukee and Buffalo. This line of propellors, in connection with a net-work of rail and plank roads, radiating from the city of Milwaukee in every direction, as far as the Mississippi, cannot fail to advance the interests of our citizens, as well as those of the miners, agriculturists, and other classes throughout the state. Manitowac is likewise very favorably situated for ship building, and I am glad to see that the enterprising citizens of that rising village are taking advantage of their position. Several fine vessels have been built at that place, and another will be ready to take to her native element early in the coming spring. Green Bay is another point, that must in time be occupied by ship yards, when the navigation of the Fox and Wisconsin rivers is open. Racine and Kenosha have sufficient facilities for building all their own sailing crafts. We ought to appreciate our advantages here, when we see immense quantities of timber every year sent to the ship yards of New York, a distance of twelve hundred miles.

From what has been said in this article, it will be seen how important it is to have a knowledge of science, which is closely connected with almost every branch of industry in which we are engaged. Under the existing condition of this country, only few can afford to devote time to the acquirement of an extensive course of education, therefore, the time set apart for educational purposes should be devoted to those branches of learning, bearing directly on the pursuit in which the individual is to be engaged. Two ele-

ments are essential to the perfection of an industrial education—science and practice. Science leads to practical eminence. A man may be very dexterous in the management of his tools, but totally ignorant of the principles on which his practice rests. Such a man can never rise to eminence in any important department of his business. Watt could never have brought the steam engine to the degree of perfection in which he left it, had he not been acquainted with the principles of science. Lord Ross had to invoke the aid of science in the improvement of his wonderful telescope, which leads to infinities of space and faintness—which places the traveler on mountain top, where foot never trod—which shows the sailor his place in the deep, and the object of his pursuit in the gloom of night—which shows the stars whose faint light is lost in the sun shine—carries us beyond our own abode, and in the glimses it gives us of the condition of other worlds, adds a mighty voice to the acclaim in which the "firmament declares the glory of God."

Science alone perfects art: therefore, it ought to hold the first rank in all our seminaries of education. Throughout this work it will be seen, that science is the fountain from which all our practical knowledge is drawn. Without science we could only grope in the dark in pursuit of the hidden treasures with which our mineral regions abound—regions of vast extent, great variety, and peculiar richness in mineral character, rendering the geology of the State of peculiar interest, not only in a geological point ot view, but as regards profit and industrial labor also. In contemplating the subject of geology, one is constrained to exclaim what mighty things are revealed by the silent hand of time! When the eye of the geologist pierces the earth, guides the way to its hidden treasures and reads its petrified pages, on

which are legibly written the geological epochs of the world and the history of its many changes before it assumed its present condition, he shall see that during most of which it was unfitted to support the present forms, either of animal or vegetable life. He shall likewise see that during these changes, it was manifestly the habitation of successive races, which disappeared from existence at the change of each period, most possessing only remote analogies to any creature now living, and that these relations seem to increase, till he finds in the foundations, which are considered most recent, remains of animals, nearly allied to the present races. Man, however, forms an exceptionn ever having been found fossil, which proves that he was called into existence later than any geological epoch. By the help of the microscope, he may read in the pages of geological history, that many mountains and rocks are entirely composed of evanescent atoms, which once had life, that this very State was once the bed of the ocean, that large drifts consisting of clay, gravel, rounded stones of various sizes, and large boulders, have been driven by ocean currents, and deposited in various parts of the State, that the action of water wore away the solid rocks in some places to the depth of several hundred feet, that subterranean force lifted up certain limited spots and whole districts; that granite and other igneous rocks, were thrown up in a molten state; that volcanic action once exerted itself in some of the regions occupied by some of our large lakes, and by groups of lakes, for which the northern portion of this State is remarkable; that the waters of the Mississippi have worn down its bed to the depth of a thousand feet or more, and that some of its tributaries have acted in a similar way. These and a thousand other phenomena, which will be

described hereafter, characterize the geology of Wisconsin, giving it a degree of interest unequalled in but few of the States. While the north seems to have been the theater of volcanic action, as may be seen from the number and variety of its primitive rocks and other visible evidences, the southern portion of the State seems to have suffered little from the agency of subterranean force, but the surface of these portions show ample evidence of the action of water.

Wisconsin is peculiarly characterized by the number and variety of its ancient monumental remains, proving the existence of a people, who in very remote antiquity, inhabited North America, but of whom nothing is known, except what can be gleaned from such of their labors as have been spared by the devastating hand of time. Silliman's Journal contains some valuable notices of Indian mounds in Wisconsin, by R. C. Taylor, Esq.; and our indefatigable townsman, I. A. Lapham, Esq., is preparing an elaborate work on the same subject, which coming from such a source cannot fail of being highly interesting. Mr. Lapham has devoted much time and labor to the antiquities of Wisconsin, and I have no doubt but the minute details which he will exhibit, will be the means of throwing some light upon the history and character of that departed race, of whom even tradition is totally ignorant. The smallest circumstance connected with the remains of antiquity often gives a clue to valuable discoveries, leading to the solution of problems, enveloped in the cobweb which the lapse of ages throws around them. As an illustration of this remark, I might mention two circumstances bearing concurrent testimony to the fact, that the architects of these Wisconsin mounds must have come from Asia. A mound has been discovered at Cassville, on the Mississippi, which is supposed to have a

trunk like that of an elephant, which goes to prove that Asia must have been the country from which that departed race had derived their origin. Another fact related by Mr. Taylor, of which there is no doubt, bears additional testimony to the Asiatic origin of that people. A monument representing the human form lies in an east and west direction near the Blue Mounds, with the arms and legs extended, the head lying toward the west, and the feet toward the east. This is the direction in which the Irish are invariably buried; and what had given rise to the practice must be referred to a period antecedent to the introduction of Christianity into Ireland. Before the introduction of Christianity into Ireland, by her patron saint, that country as well as Britain, was the slave of idolatry, worshipping numerous deities, and among them, the rising sun. This circumstance led to the practice of burying the dead with the face east, towards the rising sun. This practice as well as numerous others, to which the Irish (and Scotch) cling to this day, with that national ardency so peculiar to them, was derived from their ancestors—the Phoenicians, a people inhabiting the eastern coast of the Mediterranean Sea, on the confines of Palestine. Should another monument be found of the human form, occupying the Cardinal points, like that at the Blue Mounds, it would add another link to the chain connecting the ancient tribes of Wisconsin and the first Irish settlers, with one and the same country—Phoenicia. The following incident relating to the sepulchral rites of the Indians, is an additional proof of their oriental origin. Cooper, the Walter Scott of America, speaking of the Chief Uncas, says in his "Last of the Mohicans," "The body was deposited in an attitude of repose, facing the rising sun, with the implements of war nd the chase at hand." The state of the industrial arts

among the ancient people of this western country, as gathered from a few rude drawings, representing the mode of spinning, weaving, &c., is related to a problem of American Ethnology of peculiar increasing interest. In this country, instead of dwelling on the past, every one looks to the future. Every American goes right ahead without ever looking behind. In Europe, an antiquarian will spend days and years in the investigation of the remaining vestiges of vanished pomp and grandeur, here the object of eager pursuit is the coming power and gain. In Europe an antiquarian would feel himself well rewarded by the discovery of a glass bead after a weeks search, among the rubbish in the ruins of Pompeii; here nothing is sought with eager anxiety, but the dollar. Hence it is, that the Wisconsin Mounds are passed without notice, except by a few. Only very few will take the trouble, or spare time to bestow a thought on the origin or history of these curious monuments. General Smith, who is at present engaged in writing a history of Wisconsin, thinks they are heraldric emblems, similar to the coat of arms and crests, at present worn by different distinguished families in Europe.

There is sufficient evidence to prove that a people once inhabited this country that worked in brass, which probably was first known as a metal employed for tools. A copper instrument was found not long since, about two feet under the roots of a pine tree, in the town of Stevens Point, Portage county. It had the incontestible evidence of having been moulded. One end was rather sharp, and the other had the appearance of having been blunted by use. It presented somewhat the appearance of a drilling machine.

Having given this introductory notice of some of the subjects to be hereafter discussed in detail ,I shall next tak

up a subject intimately connected with the welfare of every civilized community. This subject is the fuel at our command in Wisconsin. But before I enter upon this new subject, it may be necessary for me, by way of apology, to say that the subject of the Wisconsin Mounds has been introduced merely to gratify the curiosity of Europeans, who feel a deep interest in such matters. Though these ancient monuments have nothing to do with the industrial resources of the State, yet for the reason above assigned, I thought, that a few pages devoted to them may not be considered entirely out of place.

CHAPTER II.

The industrial resources of every nation depend princi pally on its natural resources. Where nature supplies the raw material in great abundance, and also the power to fashion that material into form for our own use, is (all other things being equal) in general, the best field for active labor. The locality rich in iron ore, and coal to prepare the metal, to receive from the mould a thousand different forms, according to the different purposes it may be required to serve, is always favorable to the economical manufacture of that most useful, and indeed, indispensible article. Hence it is, that many parts of England and Scotland containing iron and coal, which often accompany each other, are celebrated for their iron works. The same remark applies to Pittsburgh, the Birmingham of America. There was, however, a time when iron was an article of export from Ireland to England and Scotland. The cause that led to this profitable branch of industrial labor has long since ceased to exist in Ireland. Some two hundred years ago, the same process was employed in both countries to manufacture iron, the fuel used in the process being wood charcoal, which soon became too scarce for manufacturing purposes in England

which, therefore had to draw upon Ireland where the supply of wood was still sufficient for manufacturing purposes till about a century ago, when the forests disappeared there also. As soon as the denuded state of the country denied a supply of wood for fuel, the manufacture of iron had to be abandoned in Kerry, the last place in Ireland that used wood charcoal in the manufacture of iron. All this goes to prove the truth of the general principle—that the industrial resources of every country depend principally on her natural resources. When nature ceased to supply the necessary supply of fuel in England, she had to import iron from Ireland, and when the forests of Ireland became exhausted, she also had to abandon a lucrative branch of her industry. Iron being indispensible to an advanced state of the arts, and England anxious to attain a high position, with a view to the profits derivable from an article in such universal demand, set to work in order to find a substitute for wood charcoal, which the naked state of the country refused any longer to supply. Mr. Dudley, a native of England, soon supplied this great desideratum, by invoking the aid of science, which upon all such occasions ought to be brought into requsition. Had not this man made the fortunate discovery—that coke may be substituted for charcoal, in the smelting of iron, "the condition of industry which gave field to Watt and Arkwright, could scarcely have existed." From the rapid increase of population requiring increased consumption of fuel for various domestic purposes, the forests on the continent of Europe are rapidly wasting away, by which the economical manufacture of iron, by means of wood, must be confined to those countries where a limited population admits large tracts of forests to continue to grow, as in some of the countries of the north of Europe, on

which England would be dependent for iron now, had not the discovery of Dudley rescued her from such dependance. Though this man's discovery has made England the industrial sovereign of all the world, yet that country has allowed his name to pass from this world to a better unhonored. The position I assume at the starting point, and the conclusion I arrive at will show why I enter into the history of the iron manufactures in England: therefore, I shall be forgiven for the digression. Heat being an essential agent to give liquidity to solid substances, and bring into active operation those wonderful chemical affinities which may be said to alter the very constitution of, and form new products from, substances apparently different, the fuel from which heat is produced must necessarily enter largely as an element of calculation into the gain or loss on such industrial operations. Heat is also required to convert water into steam, in order to create power and produce motion, by which cotton, flax, wool, and other fabrics may be spun and woven into cloth. Of all the elements of power, placed at our disposal by the hand of God, none is so extensive in its application as that of heat, which is employed, not only in all the chemical and metallurgic arts, but also in creating power which has effected a revolution in all the arts, from the simple operation of turning a spit in the kitchen to that of propelling the largest vessel through the pathless ocean, or the most ponderous train through lengthened space, traced out by iron tracks properly laid to guard against danger and secure safety. By the agency of steam generated by heat, wonderful effects are produced, which are profitable, partly in proportion to the cost of fuel. When nature supplies the power to give motion to machinery at a less cost than that created by heat, that power of course, if equally

effective is to be preferred. A locality possessing water privileges is to be chosen in preference to one destitute of such natural advantages, as it effects a considerable saving to the manufacturer. In the most favored parts of England as regards fuel, water power effects a saving of from five hundred to eight hundred per cent., as compared with steam, which upon a large outlay would, in the course of a year amount to a considerable sum. For the transmission of heavy goods, water carriage would be found more economical than any other placed at our disposal by the agency of steam: therefore, navigable rivers, seas, and lakes are favorable to the commerce and general industry of every country, especially, when the transmission of heavy goods to a distance becomes necessary. The economy of water carriage is strikingly illustrated by a comparison of what is now paid per ton, from New York to Milwaukee by water and land.

The following list of terms charged from New York to Milwaukee both by land and water, shows exactly the relative cost:

On rail road from New York to Buffalo, or Dunkirk and Lake Erie and Michigan, on dry goods, per hundred pounds - - - - - - -	$1,60
Iron and nails by the same route, per hundred pounds	0,90
Groceries by the same route, per hundred pound - -	1.15
From New York, via Erie Canal and steamer, via chain of lakes—dry goods, per hundred pounds - - -	0,90
Iron and nails, per hundred pounds - - - -	0.50
Groceries, per hundred pounds - - - - -	0,75

By this list of charges it is seen that on an average, the cost of transmission by land is nearly double the cost by water; and the ratio would be still greater, were it not for the competition on the railway route. It may be further observed that all the way from New York to Milwaukee is not

traveled by land, as Lakes Erie and Michigan are included in the distance. When the entire distance from New York to Milwaukee is traveled by rail road, the relative cost of transporting heavy goods by water and land, will probably be as one to three. The profits derived from the agricultural industry of a country depend in a great measure on the natural advantages peculiar to it. The same amount of labor expended on a good rich soil, in every way suited to agriculture, may produce a profit many times as great as on a poor sickly soil ill-suited to the purpose. Equal qualities of land differently circumstanced, as to convenience or manure, water carriage, and markets, will invariably leave unequal profits to the farmer. One farm within a few rods of sea weed, shell sand, marl, or other suitable manure, may yield a profit many times that of another of similar quality, situated at a distance from those manuring and renovating substances. In a similar way, it may be shown, that where nature is bountiful in supplying fuel, water power, and abundance of natural products, and also, in presenting other natural advantages, industrial labor will be rewarded in much a higher degree than where she dispenses them with a niggardly hand. It may then be assumed, that the natural resources of a nation are the true source of its wealth, when the active hand of labor is brought to bear upon them, without which, however, many of them may remain altogether useless, or be at best but of little value. As the prosperity of every country depends chiefly on its natural products and advantages, it may be necessary to discuss the problem which shows how to utilitize them, so as to derive the greatest possible gain from the time, labor, and money expended on them. The solution of this most important problem will necessarily involve economy of labor and expense of

every kind in converting all these natural products to their respective ultimate uses. To economize labor, machinery and mechanical skill are essential—knowledge of the properties, nature and constitution of the objects, on which we operate is essential, without which much time, labor and expense may be thrown away to no purpose. The comparative expense of the transmission of produce by water, rail road, or plank road, or by the ordinary roads of the country, ought to form an item in the calculation of gain or loss. These and a thousand other elements entering into the solution of the great problem relating to the utilization of the unsurpassing natural resources of the State of Wisconsin, require a knowledge varied and extensive. In the subsequent part of the work I mean to examine all industrial objects available in the State.

In this examination, it will appear that nature has placed before us in Wisconsin a wider and richer field for the active exercise of profitable labor, than is perhaps to be found in any other State of the Union. We have fuel in exhaustless quantities in our forests for domestic and industrial purposes, and that too at a cost in some places, less than coal can be procured for in any part of the Union. The almost total absence of stagnant swamps—the rolling character of the surface—the numerous running streams of crystal purity—the proximity of our ocean lakes on two sides and the father of waters on the third, with the navigable waters of the Fox and Wisconsin rivers running through it, equalizing the temperature, and giving motion to the aerial currents—and the cloudless sky of Wisconsin must necessarily render it one of the most healthful States in the Union and best adapted to European constructions. Add to these the quality of the soil, the facilities of navigation

afforded by its surrounding lakes, and by the two last named rivers, dividing it diagonally, and terminating at the Mississippi on the south west, and at Green Bay on the north east, thus opening a channel of communication with southern and eastern markets, and the State of Wisconsin cannot be surpassed as regards its adaptation to all agricultural purposes. Spangled with lakes and interspersed with prairies, oak openings and wood lands, possessing educational advantages, creditable to so young a State, and a climate unexceptionable; it is no wonder that the rapid growth of its cities and towns; of its trade and commerce; of its manufacturing industry and population should become the admiration of the age. A re-action however, has recently taken place—the progressive improvement of the State has been checked by a combination of circumstances which cannot last but for a moment. As soon as the causes that produced this re-action shall have been removed, the prosperity of the country must return. It might be considered out of my province to enter into the details of all the combined circumstahces that brought about the temporary difficulty in which the State is at present (1850) involved, but I do it with a view to point out a remedy, and also, to prevent strangers from falling into the same error which tended to create this difficulty.

We cannot conceal the fact, that the elements of nature have been unpropitious to us for the last two or three years. The fall of snow during that time having been too scanty, our winter wheat crops have been miserably deficient in quantity as well as quality, the deterioration in quality however being the consequence of an over-supply of rain during the last harvest, which superinduced rust and other diseases injurious to the grain. This deficiency in quantity

and quality, and the low price of wheat in our market, consequent on the glutted state of the English markets, have crippled the farming community, and rendered many of them unable to meet demands, which under more favorable circumstances would weigh but lightly on them. The farmer's profits having been thus curtailed by untoward circumstances, over which under his present management, he could have no control, the store-keeper and others depending on his custom must necessaaily feel the effects. The failure of our winter wheat crop is only the natural result of those unpropitious seasons, which the most favored countries in Europe and America have often experienced. A more advanced state of agricultural knowledge would enable the farmer to obviate some of these evils resulting from climate. To protect the seed from the killing effects of the winter frosts, it would be well to choose a favorable aspect for winter wheat, where the ground may be sheltered from the pernicious effects of wind and weather. It would likewise be a great improvement upon the present system to sow the seed in drills, as affordiug a better protection from the frost than the present plan usually employed in this country of sowing the seed broad-cast, which from the light covering of soil over the grain affords little or no protection to the seed. I have seen the truth of these remarks verified in several places last year, but in no place so strikingly as in the township of Menomonee, Waukesha county. The wheat was sown in drills, after having been ploughed sufficiently deep; the field was protected from the north west wind by rising ground covered with a thick forest; the land was of good quality; and the crop was most abundant, but suffered from the effects of the heavy rains that fell before it was cut. It would be advisable that the farmers of Wis-

consin should try other crops than wheat, which seems to be the only one they are anxious to raise, on account of its commanding a cash price in all our markets.

While I am on this subject, it may be well to mention that our farmers should raise more stock and cultivate a greater variety of crops than they do at present. Horned cattle, horses, sheep, and hogs, could be raised in great abundance in our State, which is admirably suited to the growth and perfection of all and every one of these species of farming stock; and the facility afforded of transmitting these to a good market by our lakes and rivers, and soon by rail roads, ought to induce the farmer to vary his system from what is at present but very precarious and not very profitable, to what he is sure would be highly remunerative. Barley would pay well here and in the eastern markets; a greater breadth of soil should therefore be devoted to that article than is at present. Besides, the partial failure of the winter wheat crop, another cause has contributed to the depression generally felt throughout the country at present. Immigrants from Europe, tempted by the low price of land in this country, as compared with the prices in those they left, too frequently purchases a larger quantity of land than they are able to pay for; giving a mortgage for the balance at high rates of interest. When pay day comes round, they, in too many cases, are unprepared to meet the demand by the produce of their farm: therefore, they are obliged to raise money at such an enormous rate of interest as must prove ruinous in the end. This keeps the farmer poor all his life, except an improvement takes place in his crops and in the market prices. No one should purchase more land than he is able to pay for, nor should he under any circumstance leave himself without the means of working his

farm, as land is of little value without the means of cultivating it. There is no use in paying taxes on land which produces nothing. For these reasons, I would recommend to every one to pay down for his land, and keep as much money as will enable him to work it to advantage. He must have a plough, a harrow, a spade, and other implements of husbandry, besides a team of horses, or a yoke of oven. He will besides, require milk, butter, seed, and other necessaries for the use of his farm and family, till his crops come round. Let him at all events keep out of debt, as no return which the farm will make the first year can enable him to pay the enormous interest demanded in this western country. The truth of what I have stated here is proved by the vast number of mortgages that have been foreclosed during the year just past, in all these western states, owing to the insatiable desire of getting more land than people are able to pay for. Before I conclude this chapter, it may be useful to point out another mistake generally committed by the farmers of Wisconsin. Besides the propensity of purchasing too much land, they invariably manifest too great a desire to till more than they ought, which is a fallacy, not however so ruinous in its results as that of buying more than they can pay for. It is a mistake to till more than what can be done well, as ten acres well ploughed, thoroughly drained, and carefully managed and attended to in the progress of its growth, will leave more profit than thirty scraped over and left to chance after. I have seen the truth of this proved in many parts of this State, but in no place so fully as in the outskirts of Milwaukee, where an industrious and skillful German makes more of an acre than a country farmer does of five. This ought to be a useful lesson to our farmers. They should manifest a greater desire to cultivate

a small quantity well, than a large quantity badly, as by doing so, they would be sure of deriving a greater profit from their labor and outlay of capital. Looking to the present condition of Wisconsin, it must be admitted, that for many years to come her staple industry must be agriculture, therefore, it becomes the imperative duty of those possessing the power and influence to provide instruction for the people in that branch of industry. Instruction precedes improvement, hence the State is bound to provide the farmer with the means of acquiring knowledge, without which he is sure to follow in the footsteps of his father. This knowledge should be imparted to the boy at school, where he ought to be instructed practically, how to turn every thing to the best possible advantage. Nothing would tend to advance the interest of the State more than to connect agricultural instruction with the usual course already adopted in all our common schools, as well as in all our colleges throughout the State. This may be done without infringing materially on the funds, which, so far as the common schools are concerned, are ample for all purposes. In a subsequent part of the work I mean to resume this subject, and show how the plan may be effectually carried out.

Abundance and cheapness of fuel form chief elements of success in a vast field of industry: therefore, it becomes necessary to compare the relative heating power of such articles of fuel as are used, as well for domestic purposes, as for chemical, metalurgic and steam purposes, by which we can ascertain their comparative economy, and hence make use of that which will leave most profit. The only articles of fuel employed to any extent are turf, (peat,) wood, and coal. Peat being found only in very limited quantities in this State, it is scarcely necessary to introduce it into the

discussion of the problem under consideration. However, as it is extensively used for very important purposes in other countries, a brief account of its origin, character, and use may not be unacceptable. The production of peat is confined to places containing water, when the temperature is so ow as that vegetables may decompose without putrifying. In the production of peat, a species of moss (sphagnum) is allowed on all hands to have been a principal agent, and superabundant moisture the inducing cause. The great golden hair moss (polytrichum) seems to act no inconsiderable part in the production of turf bogs. Many species of feather moss (hypnum); thread moss (bryum); spring moss (mnium); besides many other species lend their assistance. It is a fact not more curious than it is true, that many bogs in the north of Europe and Ireland occupy the place of immense forests of pine and oak, many of them having disappeared within the historic era. Such changes are brought about by the fall of trees, and the stagnation of water caused by their trunks and branches obstructing the free passage or drainage of the atmospheric waters, and giving rise to a marsh. Mossess appear to require a much lower temperature and a more rough climate than most other vegetables. Their most vigorous growth and propagation are in the spring and autumn. In low situations, they are seldom or never seen growing in the middle of summer; heat always impeding their vegetation. It is an opinion very generally entertained, that most of the peat bogs of Europe are not more ancient than the age in which Julius Ceaser lived, and I have no doubt that many of the bogs of Ireland are not of an older date than Henry the Second's reign, when extensive forests were cut down by his orders, to prevent the Irish from taking shelter in them, and

harrassing his troops. A peat bog is in process of formation on either side of the Menomonee river, near Milwaukee. The quantity of peat moss already accumulated in that locality amounts to many feet in depth, and I have no doubt but that a considerable part of that valley, which I could now point out, will in time become a vegetable mass of turf bog, if the process now in operation be not checked. All that part of the valley now occupied by the deep marsh, must have been at no distant period, an estuary or small lake, connected with Lake Michigan by the present stream. Had not the progress of growth been checked, all the lower parts of the city of Milwaukee would in the process of time, be covered with a turf bog. A similar process as that now in operation in the marsh, is going on in many parts of the State; but the result as an article of fuel, will be of little value so long as our forests last. In Ireland, where the seventh part of the island is bog, it is a matter of much national interest to convert so large a portion to a profitable use. The fault that characterizes turf as a fuel is want of density, which renders it difficult to remove, and also, to concentrate the quantity of heat required for numerous purposes. In the subsequent part of this work, I mean to point out some of the industrial purposes to which turf may be practically applied. At present, I mean to confine my enquiry to its economic employment in the smelting of iron, and also, in the manufacture of cutlery and other instruments requiring strength, elasticity, and durability. When we employ pit coal in the smelting of iron, the article produced generally retains impurities, which reduces its strength and lessens its value. But when turf charcoal is employed, iron is produced in its greatest purity. It may be necessary for my purpose to show that charcoal produced

from turf is nearly allied to that produced from wood. When the forests of Englandand Ireland became exhausted, both countries had recourse to Russia and Sweden, where iron was had in great purity, from the circumstance of its being smeltered with charcoal. From experiments carefully conducted in Ireland to ascertain the comparative heating power of turf, and also, its comparative cost, it was found that when perfectly dry, turf had a heating power equal to half that of English coal. When English coal was used, the cost of fuel for a horse power was found to be about fifteen cents per working day of twelve hours; but using turf manufactured in the ordinary way, the cost of fuel for a horse power was eighteen cents, for the day of twelve hours, which no doubt is far too much, if the turf had been economically worked and the fire-place properly constructed, neither of which was the case in the experiments above refered to. Much of course depends on the cost of carriage, in estimating the expense of turf. Being of great bulk, as compared with coal, the cost of transmission to a distance forms a large item. A gentleman in England trying the comparative expense of turf and coal, as heating agents to generate steam, found that an engine, when turf was used, to produce steam, did the same amount of work for just half the price, as when coal was used. This great disparity in the expense of the coal, was due in this case, to the distance it had to be drawn, and to the rigid economy used in preparing the turf and the fire-place. On the continent of Europe where the coal fields are of limited extent, and where the promotion of native industry is an object of primary importance, the economy of every source of fuel becomes a matter of necessity. Turf is extensively used in the industrial arts in Prussia, in Bavaria, and in France.

Within a few years considerable attention has been paid to the manufacture of turf on a large scale in Ireland and England. Its large bulk and the characteristic difficulty of concentrating its heat for certain purposes, formed the chief objection to its general use in Ireland. To remove its porisity, Lord Willoughby, an English nobleman, invented a machine to compress the peat by means of steam, but on account of its complexity and enormous price, its use has been dispensed with. Charler Wye Williams, of Dublin, brought into use a preparation of turf which appears to answer well. His process is, to dry the turf well, and then impregnate it with tar, which renders it water proof, besides increasing its calorific power to equal that of coal very nearly. The process of impregnating the turf with tar is by no means expensive. Mr. Williams uses a hydraulic press. The turf is broken or rather mashed up, and then rolled between cloths, to allow only the water to escape when subjected to pressure. This process reduces it to about one-third of the volume, and it loses about two-fifths of its weight, by the escape of the water through the pores of the cloth. When thus pressed, it is set out to dry. The density of the coke produced from this preparation exceeds that of wood charcoal, and the expense but very little. The peat produced by Mr. Wye Williams' process is used extensively in mills, distilleries, and inland steamboats. In connection with my business in Dublin as Civil Engineer, I manufactured to a limited extent, peat and brick presses, which, however, were found too expensive when employed in compressing turf.

The turf made by my press equaled in solidity the best bituminous coal, and took a polish equal to the finest and closest grained wood. This turf burned very slowly and emitted very little flame, but sent out heat of great inten-

sity. When mixed with culm or the dust of coal, it burned somewhat like stone coal, of which I shall write presently. In Ireland, where bog is found in such abundance, the farmers use the stuff not only as a source of heat but also as a manure, from which they derive great profit. Its qualities in many respects are very curious and somewhat peculiar. In its natural state, scarcely any thing will grow in it except the mosses from which it is produced; but by destroying its anticeptic quality it becomes an excellent manure, especially, when mixed with other substances. It preserves animal and vegetable substance for a very long period. I have seen some butter which had been buried deep in a bog for a great many years, preserve all its characteristic properties, and it is known to preserve wood from decay for many centuries. The quantity of iron occasionally associated with bog is one of the most curious circumstances connected with it. Of this oar I shall speak further on.

Peat contains much less nitrogen than coal, and therefore, the liquor obtained from it by distillation, contains no free ammonia. It contains accetic acid, but in such small quantities as not to become an object of manufacture—like wood. The heating character of turf is, to distribute the heat over a large area, whilst no one point is heated to any considerable degree of intensity injurious to metals; by which it is peculiarly adapted to steam boilers, which are frequently burned away from the intensity of the heat of coal or coke. Possessing a large quantity of inflammable ingredients, it makes a most cheerful fire for domestic purposes. Being distributed over a large portion of Ireland, composing about one-seventh of its area, it is one of the very few comforts the poor of that very unfortunate country enjoy. The

quality of turf varies considerably. When ignited, it emits inflammable gas and much water, and leaves a light charcoal. The specimens which were analyzed in Ireland, by Sir Robert Kane, yielded the respective quantities of volatile matter, pure charcoal and ashes in the following table:

	LIGHT TURF.	DENSE	TURF.
Volatile matter - - - - -	78,68	72,80	70,10
Pure charcoal - - - - -	23,82	19,14	23,66
Ashes - - - - - - - -	2,55	8,06	6,24
	100,00	100,00	100,00

I have devoted more space to the article of turf, as a source of heat, than its limited quantity in Wisconsin would appear to warrant, but as the state is not altogether destitute of it, and as it is extensively used in other countries for various industrial purposes, I thought that to omit it altogether, might be considered a fault in such a work as the present, at least in a scientific point of view. Though the State of Wisconsin is considered not to contain coal, yet, as it is used in every part, in all industrial operations of magnitude, a chapter on it as a source of heat, appears to be indispensable. Coal has had its origin in the amassing together of a large quantity of vegetable matter, at a period long before man had made his appearance on the stage of existence.

CHAPTER III.

FROM the vast quantity of vegetable matter necessary to form mány of the coal fields which are found in various parts of the Old and New Worlds, there is no doubt but that vegetation must have been then much more rapid than at present in the same localities. From the nature of the trees and plants, which are still discoverable in a fossil state in many of the coal beds, it is evident that they must have grown in a climate much warmer than is enjoyed by the same localities at present. The plants discernable in the coal, belong, for the most part, to a tropical climate. The luxuriance of their growth, as indicated by their gigantic size, gives a temperate climate no claim to them. All their characteristic forms and types prove their origin as belonging to a climate of high temperature. To what are we to attribute the change of temperature from the coal formation period to the present? Is it caused by the change of the position of our globe in reference to the sun? Or, are we to refer the cause to the action of internal heat? Physical astronomy proves that no very great change of temperature can result from any change of position that can possibly take place in our planet in relation to the sun—that change being confined within very narrow limits. We are, therefore, constrained to refer the cause of the rapid growth of those gigantic fossil plants found in temperate climates to

internal heat. The theory which refers the large growth of plants to internal heat, is not at variance with laws at present in active operation. The number of burning mountains at present to be found in very high latitudes, in every quarter of the globe, as well as in the numerous islands scattered over the face of the deep, attest the fact, that none of nature's laws are violated, by referring that high degree of temperature requisite for the production of tropical plants to internal heat, existing in high latitudes. The change of temperature from high to low, is also due to the change of circumstances, such as the relative change of land and water, of high and low lands, dimunition of internal heat, and other natural causes, which I shall discuss in the chapter devoted to the climate of Wisconsin.

Sir John Richardson is of opinion, that the Arctic regions were once warm enough to produce vegetation, sufficient to support a vast creation of herbivorous animals, such as we find entombed therein. He attributes the excessive vegetation to internal heat.

The organization of many trees and plants is perfectly visible in some specimens of coal, but in others, all traces of their original form is completely obliterated. Geology teaches us that the superficial crust of our planet has been subjected to natural convulsions, in which forests were prostrated, and currents set in motion, bearing with them in their course masses of vegetable matter, which being deposited under enormous pressure, where the influence of elevated temperature tended to decompose them, when in contact with water, was converted into coal after the lapse of ages. Geology sets no limits to her periods, each of which may consist of ages, through which natural laws continue to operate without intermission, ending in those won-

derful results, daily brought to light by the industry of scientific research. Numerous geological specimens point out the progress of change effected by time under favorable circumstances. Fossil wood or brown coal, exhibits a state between recent wood and perfect coal. We can also trace the chemical changes which take place in the conversion of wood into coal, and also learn from the fossil remains of many species of plants, the internal structure and character of the numerous classes or divisions of the ancient Flora. Although no one at this time denies the vegetable origin of coal, yet evidence of the original structure is not in all cases attainable, the most perfect butiminous coal having undergone complete liquaction, by which all traces of its vegetable origin are completely obliterated. It would not suit my present purpose to dwell at much greater length on the origin of coal; but the article being of such general use, I am induced to offer a few more remarks on the subject. It is rather interesting to trace the causes that produce different changes in vegetable matter. Bituminous coal is generally found where the strata remain level and unbroken; and anthracite where the stratification is broken and distorted. When the gases escape in consequence of a disturbing force, bituminous coal is transformed into anthracite, to which various names are given; such as split coal, glance coal, culm, &c. When no volcanic action disturbs the stratification, the carbonic acid, carbonated hydrogen, nitrogen, and oliphiant gases remain undisturbed in the coal. This accounts for the large quantities of anthracite found in the disturbed rocks of Pennsylvania, while the level regions abound in bituminous coal. And when the action of heat expels nearly all the gaseous ingredients from anthracite, it is transformed into plumbago.

Mr Lyel writing on the great accumulation of anthracite in Pennsylvania, says, "The vegetable matter which is represented by the immense mass of anthracite must, before it was condensed by pressure, and the discharge of its oxygen, hydrogen, and other volatile idgredients, have been probably between two hundred and three hundred feet thick. The accumulation of such a thickness of the remains of plants so unmixed with earthy ingredients would be most difficult to explain on the hypothesis of their having been drifted into the place they now occupy. Whether we regard the stagmaria as roots, or embrace the doctrine of their being aquatic plants, no one can doubt that they at least are fosilified on the very spot where they grew, and as all agree that they are not marine plants, they must be terrestrial." It is however evident, that water is constantly drifting and depositing vegetable matter, which in time will become coal, if placed under favorable circumstances. The bogs of Europe grew where they now stand, and would under favorable circumstances become coal, which, in general terms is, carbonized mass, in which the internal structure generally ...mains, while in most cases, the external forms are obliterated. When the microscope is brought to bear on geological objects, it is probable that the internal structure and external forms of minute vegetable fosils shall be distinctly re...gnized. When I come to treat of the geology of Wisconsin, I shall point out those rock formations with which coal is generally associated. I might mention here that the coal formation stands quite distinct from those above and ...elow it, and that its formation was limited to one geological period, which from the depth of some of the beds found in this country as well as in England, must have taken a vast time to accumulate. Though geologists limit the coal

formation to one geological period, yet I see no reason to restrict the production of cumbustible bituminous coal to any single period, or series of strata, as it may occur in situations presenting local conditions favorable to the complete bituminization of masses of vegetable matter. These recent formations. however, in temperate climates, can never equal in depth or magnitude, those formations peculiar to what is called the coal formation period, which seems from its high temperature, to be peculiarly favorable to the growth of these gigantic plants, peculiar to that period. I have no douht but that the production of lignite is constantly going on, and the beds of recent origin found in the State of Maine attest the fact. This recent production is found in a bog near Limerick, in that State, at a depth of four feet under the surface. It is represented as true bituminous coal. I have seen beds of lignite at Laugh Neagh, in Ireland, which clearly exhibit the process of formation now going on.—This fuel is intermediate between coal and wood. In the specimens I have seen, the structure of the wood was discernable. It is generally of a brown color, and its economic value is about two thirds that of average coal. Its heat is not so intense as that of coal, but more diffused.—Lignite, when ignited, burns brilliantly and gives out gaseous matter, leaving dense, black charcoal. The average constitution of two specimens of lignite, as also their chemical composition, are seen in the following tables:

Volatile matter, - - - -	55.700
Pure charcoal, - - - - -	31.875
Ashes, - - - - - -	12.425
	100.000

Carbon, - - - - -	54.960
Hydrogen, - - - - -	6.650
Oxygen, - - - - -	25.965
Ashes, - - - - - -	12.425
	100.000

Anthracite is a description of coal well known in many parts of the world. Its composition is very uniform, and it burns without flame, and does not cake. It is generally termed mineral charcoal, and is considered pure carbon mixed only with ashes. In some localities I have seen this coal associated with iron pyrites, and from the sulphurious fumes it emitted, it was not fit for domestic purposes, nor for any purpose in the arts. The average composition of pure anthracite may be taken as represented by the following numbers-

Carbon, - - - - -	94.125
Ashes, - - - - - -	5.875
	100.000

The peculiar composition of anthracite limits its use in the arts, in a very high degree, where science is not brought into requisition to obviate the disadvadtages peculiar to it. In other respects it has many advantages. It conducts heat but slowly, and is difficult to burn. It contains very little combustible matter; but produces a most intense heat, which, however, is confined to the immediate neighborhood of the fire. When analysed it yields the following quantities:

Volatile matter, - - -	10.20
Pure carbon, - - - - -	82.42
Ashes, - - - -	7.38
	100.000

The peculiarity which confines the heat to the neighborhood of the fire, tends to burn the boiler when used to generate steam, but is by no means effective in causing evaporation. Science, however, obviates this defect, by passing the vapor of water through the red-hot coal. The water being decomposed, the oxygen combines with carbon, the composition forming carbonic oxide, and the hydrogen is set free. "These mixed combustible gases pass into the flues, and inflaming in the excess of air which enters, gives a sheet of flame, which I have seen to extend for thirty feet under and through a boiler." By thus allowing the vapor of water to pass through red-hot anthracite, it is converted into flaming coal. The process gives no gain or loss of heat, but removes it from where it would act injuriously, and distributes it over a large area, where its maximum economical effect is obtained. Its economical effect was tested on the Liverpool and Manchester Rail Road, and the result of the experiment showed that 5½ hundred of anthracite generated the same amount of power, by the agency of steam, as 7½ hundred of coke, which is the most expensive fuel at our disposal. That which accomplishes most, in any operation whatsoever, for the same outlay, is considered the most economical. In the above experiment, 5½ hundred of anthracite accomplishes the same duty as 7½ hundred of coke, and coke, besides, is much more costly than anthracite. Hence the economy of this fuel when used under the direction of science, without which, its use would be a positive loss. It is known that pure carbon reduces to the metallic state, 35 parts of lead, while bituminous coal only reduces from 25 to 30; but when anthracite is used, it reduces from 28 to 32 times its own weight, which shows that where it can be suitably employed, it is among the best fuels.

The next specimen of coal I shall notice, is bituminous coal, which is the fitest for most purposes. It ignites freely, gives out flame, and cakes. Its effective power to generate steam, as compared with other sources of heat, is seen in this table.

Hydrogen,	46.8	Average Coal,	12.0
Pure Charcoal,	14.6	Best Turf,	6.0
Coke,	13.0	Dry Wood	7.0
Best Turf Coke,	12.8	Wood, not dried,	5.2

These numbers are the result of a series of trials, expressly made by competent scientific persons, with a view to ascertain the absolute heating power of fuels of different kinds. In the experiments one pound of each kind of fuel was employed, and the testing power was, to find how many pounds of water a pound of each kind was capable of evaporating. The coal employed was bituminous, of the average kind.—By looking over the numbers representing the evaporating power of different kinds of fuel, it will be seen that hydrogen has the greatest, and fresh wood the least heating power; and that coke made of coals, turf coke, and bituminous coals have nearly equal power, and are very little inferior to pure charcoal. It may be further seen that the best quality of turf, not compressed, is very little inferior to dry wood. Doctor Fyfe, of Edinburgh, made several trials to aseertain the relative evaporative power of anthracite and bituminous coal, and his experiments showed that with the same furnace one pound of anthracite evaporated 7.94 pounds of water, whilst one pound of coal evaporated only 6.62 pounds.—Dr. Fyfe remarks that the heating power of any fuel is proportional to the quantity of fixed carbon it contains; that is, of pure coke. The following numbers represent their respective ingredients:

	Anthracite.	Bituminous Coal.
Moisture,	4.5	7.5
Volatile matter,	13.3	34.5
Fixed carbon,	71.4	50.5
Ashes,	10.8	7.5
	100.0	100.0

The fixed carbon in anthracite and bituminous coal are represented by 71.4 and 50.5 which are nearly proportional to the numbers 7.94 and 6.62, expressing their effective power in generating steam. The result varies when the quality of the fuel varies, and also when the circumstances under which the fuel burns, and the steam is generated vary. But for all practical purposes, the tabular numbers above may be taken to express the relative ingredients of anthracite and bituminous coal.

The United States are richer in coal than any part of the known world, as may be seen from the following taken from the valuable work of Mr. C. Taylor:

United States,	133,132	square miles.
British America,	18,000	" "
Great Britain,	11,000	" "
France,	1,709	" "
Spain,	3,408	" "
Belgium,	528	" "

It may be seen from this table that the United States contain over twelve times as great an extent containing coal as Great Britain.

A single one of these gigantic mines runs about 900 miles from Pennsylvania to Alabana, and embraces 50,000 square miles, equal to the whole surface of England proper.

The native fuel at our disposal in Wisconsin is wood,

which has digerent heating powers. As a general thing, the heating power of wood is proportional to its density, all other things being equal. But a difference in the composition of woods of equal density will, of course, produce a difference in their heating powers. 'Though we are destitute of coal in Wisconsin, as far as we know at present, yet we have a vast source of heat in our forests. The state of Wisconsin is computed to contain 53,924 square miles, which being reduced to square acres, gives 34,511,360. Now it is not too much to allow, on an average, 25 cords to an acre which would place 862,784,000 cords at our disposal, for domestic purposes, if the whole State were covered with wood. Allowing that the prairie and cleared lands comprise half the surface, half the above quantity is available for domestic purposes—namely, 431,392,000 cords. The heating quality of the woods generally employed for fuel, ranges in the following order: Iron-Wood, Hickory, Maple, White-Oak, Red-Oak, Beech, Buttercup, Yellow-Pine, White-Pine, Bass-Wood, Poplar.

Iron-Wood being found only in small quantities, its use as a fuel may be left out. The above quantity of firewood is. of course, but an aproximation, which, however, cannot be very far from the truth.

The number of houses in the State, in 1850, was 56,281; allowing each house on an average to burn thirty cords in a year, the population of 1850 would require 255 years to consume all the available fuel in Wisconsin at present.

In one of the back tables it is seen that one pound of coal evaporates twelve pounds of water, and one pound of dry wood, only seven pounds; the effective power of coal in evaporating water, as compared with that of dry wood, is as twelve to seven. Hence the effective power of woc

only 7-12ths that of coal, the weight being equal. Mr. Scott Russell, an eminent Scotch Engineer, gives the following as the working conditions of the evaporation of water and the generation of power; one cubic foot of water evoporated per hour, is equal to one horse power: 11 pounds of coal evaporate a cubic foot of water, therefore, from the above proportion, nearly 19 pounds of dry wood evaporate a cubic foot. One poued of coal evaporates 6.6 pounds of water; one pound of wood evaporates 3.82 pounds. Here the quantity of water required to generate a horse-power of steam is nearly double what theory assigns to it above, and the quantity of coal and wood is also nearly double. This great difference is the result of using a badly shaped boiler, whose greatest evaporative effect is 9 pounds (nearly) of water for one pound of coal, and 5½ pounds of water for one pound of wood. We may then consider a horse power as represented by one cubic foot of water evaporated per hour, with at least ten pounds of coal or seventeen pounds of wood, using the ordinary steam engine and common wagon boiler. Now, if we suppose a cord of wood to weigh three thousand pounds, 4,313,928,000 cords would weigh 1,294,176,000,000 pounds, which, divided by 17 gives 76,128,000,000 horse power. By using the improved boiler purforated by flues, and working the steam expansively, the same quantity of fuel would produce nearly double the hore power above given; that is, all the wood in Wisconsin at present is sufficient to generate steam equal to 152,256,000,000 horse power. The power of a horse is variously rated. Bolton and Watt are of opinion that a horse is able to raise 32,000 pounds avoirdupois one foot high in one minute; others make it 44,000 pounds, 27,000 and 33,000. It is common in practice to allow 44,000 pounds, or at least

23,000 lbs. for one horse power. In calculating hosre power it should be stated which of these two numbers has been taken.

If the rapid increase of population should continue, as I have no doubt it will, the forest will soon vanish, and coal must be used as a substitute. But should coal, as a fuel be found too expensive, every proprietor will find it necessary to keep up a fresh supply of growing timber for his own use, at least, by which the state can never suffer for want of fuel for domestic purposes. In the course of time those persons occupying prairies will be driven to the necessity of planting for domestic purposes. We find that in France and other European countries, the forests are allowed to grow in order to supply a dense population with fuel; why then should we apprehend a scarcity in Wisconsin for, at least, some ages to come. When the carriage of cord-wood becomes too expensive, which of course it must in some localities, at no distant period, they must have recsurse to coal, which can be had from the neighboring states of Illinois, Minesota and Iowa, at a cost of transport which will diminish in proportion as rail-roads and water communication will increase. The facilities of transport offered by our lakes and rivers, and the projected rail-roads through our State, will enable us to procure coal at little more cost than it may be procured for in some parts of those states where it is found. When we employ coal in the smelting of iron the article produced preserves impurities highly injurious to it; therefore, for the finer purposes of cutlery and of machinery, we invariably use charcoal. England, so justly celebrated for its manufacture of iron, imports quantities from Russia and Sweden, which being smelted and refined by means of wood charcoal, is better adapted to all the purposes of fine work than any that can be manufactnred by

means of coal. Our numerous mines, in connection with the great quantities of wood charcoal at our disposal, will, when vigorously worked, prove a source of wealth to our state. In the progress of the work I shall have occasion to say more in detail of our mines, which, in some metals, are the richest in the world.

Experience has proved that trees for lumber, if cut at one season of the year, are far more durable than if cut at another. Wood, to be lasting must be cut at the end of Summer, or beginning of autumn; but if it is wished to clothe the surface with a new growth of trees, the cutting must be made late in winter. The strength and elasticity depend considerably on the season of cutting, also. In another point of view, the amount of water contained in the wood is of importance. The amount of water in wood is sometimes from 20 to 50 per cent., and the average may be rated at 35 or 40 per cent of its weight, which, in its carriage to market makes a great difference in the amount of labor expended. The water in wood intended for firing is not only of no good, but of positive injury. As all the heat required to dissipate the water is in a latent state while employed in this process, its effect is lost, especially if the wood is consumed on the hearth or in a stove. This should be recollected by every one buying green wood. The caloric in the wood is employed first to convert the water it contains into steam, in which state it escapes through the pores. During this process the heat is in a latent state, and its heating influence partly lost. Hence it appears that dry wood has two advantages—the one in the way of carriage to market, and the other in its heating influence—two very important advantages.

The statistics of the lumber trade, conducted on the Wis-

consin, Black, Chippewa, and the St. Croix rivers and their tributaries, as taken from Dr. Owen's Report, published in 1848, gives the following quantities, which will convey some idea of the importance of this trade to the State of Wisconsin. In 1847 there were on the Wisconsin River, 24 mills, running 45 saws, and sawing about 19½ millions of square feet, worth, at the mills, about $6 per 1000, and 3 millions of shingles, worth $2 per 1000. On Black River and its tributaries, there were, at the time above referred to, 13 mills, running 16 saws, and turning out 6,350,000 feet of lumber annually, and 500,000 shingles, besides 45,000 feet of square timber, at $25 per thousand. On the Chippewa and its tributaries, there were five mill and seven saws, manufacturing 5,350,000 feet of lumber, 3,100,000 lathing, 1,300,000 shingles, 50,000 feet of square timber, and 2,000 logs. On the St. Croix and its tributaries, there were five mills and twelve saws in operation, which cut 7,700.000 feet of boards and plank, 6,000,000 laths, 100,000 shingles, 15,000 logs. By the time this reaches St. Louis, its value is nearly doubled, making the actual income to the inhabitants of these locations from this trade alone, upwards of half a million of dollars. From the influx of strangers, to these regions, since the above dates, and the increasing demand for lumber in and out of the State, the annual quantity manufactured at present in these localities, cannot fall short of an amount worth one million. From the calculation, in the pine regions of New York and New England, of the quantity of lumber which an acre of land will produce, 5000 acres of land must be denuded, annually, in the Chipewa district alone. South of the Wisconsin river there are no pine lands of any extent; therefore the whole Mississippi country below the Wisconsin river, and north of the mouth of the

Ohio, must be supplied with timber from the Chippewa land district. Dr. Owen concludes his report in the following words: "The future circumstances and value of the trade can be well appreciated by those who have witnessed the rate of Immigration into these vast and fertile plains of the United States, particularly when they consider the preference given to wooden buildings in the west, and the increased consumption of building material, not only in the larger cities, but also for the construction of those numerous towns and villages which spring up, as if by magic, along the shores of the Mississippi and its tributaries." Some of the pine lands are valuable only for the immense quantity of timber they produce, To give some idea of the quantity, the steamboat War Eagle towed out of Lake St. Croix, at one time, a raft of logs and sawed lumber, which covered eleven acres by measurement. Further on will be seen the immense amount of profit derived from the lumber trade in those districts having an outlet for their trade through Green Bay. The improvement already made on the Fox River, and those under contract, give strong hopes of a vast increase in the lumber business of that extensive region whose natural outlet is Green Bay. But recent difficulties connected with the improvement of that river, have excited a general fear that the hopes of those anxious for the improvement, will never be realised. As matters stand at present, it is hard to say whether or not the works will ever be completed. As so much of the public money has been already expended, and as the proposed improvement would doubtless prove of vast benefit to a very large district, it is to be regretted that it should be checked in its progress by any untoward circumstance growing out of causes which called forth the authority of the executive. The legislature

is this moment actively engaged in debating pro et con, the expediency of stopping the works altogether, or pushing them on to completion. I should be sorry that works of such importance to a vast district should now be abandoned. With a prospect of a net-work of railroads through every part of the State, the benefit resulting from the opening of the navigation of the Fox and Wisconsin Rivers may not be equal to the expectations at first entertained; but be that as it may, the navigation of these rivers could not fail of being a source of benefit to the lumber-trade of the Northwest, as well as to other branches of business depending on the transportation of heavy articles, which can best and most economically be effected by water carriage.* The following statistics of the businens of the Northwest will further show the importance of the lumber trade of this distant region, as well as amount of cash in circulation:

ESTIMATED EXPORTS OF 1851.

There are on the Mississippi River, above the mouth of the St. Croix Rtver, engaged in cutting logs, 11 saws. cutting 15 millions feet of lumber, at $10 per thousand,	150,000
Ten millions of logs at $5,	50,000
On the St. Croix are 17 saws cutting 26 millions feet, at $10 per thousand,	260,000
Twenty-two millions, at $5,	110,000
Square lumber, lathing, &c.,	10,000
	380,000

One mill is in progress of erection for driving sixty saws, at the outlet of St. Croix Lake.

*The difficulty above alluded to has been amicably settled, and the works are now progressing.

The Chippewa River yields twenty millions feet of lumber, at $10,	200,000
Four million feet of logs, at 5 dellars,	20,000
Square timber, lathing, &c.,	5,000
	225,000
The Black River yields fifteen millions feet, at ten dollars,	150,000
Logs, square timber, lathing, &c.,	15,000
Furs and pelfries for the whole region,	200,000
Whole amount of exports estimated,	$1,170,000

ESTIMATED AMOUNT OF IMPORTS.

For St. Croix and Chippewa,

7,454 bbls of	Pork, at $16,	119,264
14.994 "	Flour, at 6 dollars,	89,364
14,000 bushels of	Oats, at 50 cents,	7,000
10,000 "	Corn, at one dollar,	10,000
		223,688

For the Upper Mississippi and Black Rivers.

2,100 bbls. of	Pork, at 16 dollars,	33,600
4,200 "	Flour, at 6 dollars,	25,200
2,000 bushels	Corn, at one dollar,	2,000
4,000 "	Oats, at fifty cents,	2,000
		62,800
Groceries and other necessaries, including goods for Indian Annuities,		2,000,000
		$2,286,488

Estimated amount paid out by the General Government.

Indian Annuities,	208,000
For Territorial Government,	30,000
For support of Troops,	400,000

No. of Steamboats in trade in 1851,	7.	
" Arrivals and departures	246.	
Amount of passages,		190,225
No. of tons freight carried,	36,900.	
Amount paid for freight, at $6 per ton, from Galena,		258,500
Freight 4,500 head of stock, shipped up,		2,700
Total amount of receipts from steamboats,		451,425

I only intended to give the lumber trade of this district, as belonging legitimately to this chapter, but the section of country being remote and somewhat detached, it occurred to me that the exports and imports, and the amount paid out by the General Government, exhibited in one sheet, would prove acceptable to some persons desirous to know the amount of money in circulation in the district.

The lumber trade of the Two Rivers must be considerable, when, at a very early season 55,500 logs have been got out, ready to float down the river. When sawed, these will make 19 million feet of lumber. Shingle, and cedar posts, to an enormous amound, have been bought for the Chicago market, which has to depend ensirely on other states for its supply of lumber.

It is said that the trade of the pinery on Wisconsin River, above Plover, is worth five hundred thousand dollars annually. The New York Journal of Commerce says, that—"Large quantities of timber, consisting of oak knees, plank &c., now lie in our ship-yards, and are being worked up into elegant ships, after having performed a journey of over one thousand miles, from Wisconsin."

The manufacture of staves to an enormous amount, is carried on in Wisconsin, especially along the lake Michigan

shore, in Manitowac, Sheboygan and Washington counties, which supply Milwaukee and other towns in the State.—But the principal market is Chicago, where a vast number of flour and pork barrels are made.

The lumber trade of Milwaukee has been less in 1852 than the preceding year. The following are the total receipts for the season of 1852:

Lumber, feet,	12,649,426
Laths,	1,565,000
Shingles,	6,820,000

In the northern part of what is known as the Menomonee district, are large and extensive pineries, extending for miles beyond the head waters of the Wolf River. These extensive pineries will open a lumber trade in a few years that will be unparallelled by any thing of a similar character in the history of the West. The trees grow to a remarkable height, straight, free, and make clear lumber, some of which has been taken to St. Louis market, where it has been pronounced of excellent quality. Those pineries are destined to be an important item in the commerce of Wisconsin as soon as an outlet can be made through the Fox and Wisconsin rivers. A large river, navigable two hundred miles, extends up to the very heart of the district. The untold wealth of her forests, the availability of her water power, and the superior productions of her soil must be inducements for capital and immigration. When the means of access to this vast region are open, it cannot remain long unknown. The Fox River improvement is the key by which the entire tract is laid open. These pineries form a part of the Menomenee District, lying north of the Fox River, equal in extent to the State of Connecticut. It was ceded by the Menomonee Indians to the United States' Gov-

ernment in, 1841. According to the articles of that treaty the tribe was to deliver up possession in July, 1852. The impression has gone abroad that the purchase comprised the poorest and most unproductive portion of Wisconsin. Hence emigrants destined for Wisconsin, have invariably shunned it, and located themselves, either in the Western part of the State, or in Minnesota. The true statement of facts in regard to this tract has never yet appeared. Instead of being the poorest portion of Wisconsin, it is, if not directly the reverse, at least equal, perhaps to the most favored part of the State, the soil being exceedingly productive. A gentleman speaking of this tract says, "I have seen as good corn in Waupaca County, as in any portion of the State, the yield, according to the report of some old farmers, being fifty bushels to the acre." The face of the country from Waupaca to Berlin is rolling and covered with beautiful oak openings and an occasional tract of pine, with numerous lakes of the purest water, alive with fish of the most delicious flavor. This tract is now in the market at $1,25 per acre, and on it are several improvements made by the tribe that occupied it; which would make a purchase in parts of this region desirable.

Fish and Lumber trade of Green Bay, for the present Season, (1852.)

Shingles,	13,500,000
Shingle Bolts, cords,	1,300
Logs, lumber, and square timber, ft.,	13,950,000
Oak staves, ft.,	2,000,000
Fish, bbls.,	6,000
Ashes, tons,	50

Steven's Point, in Portage County, is situated on the Wisconsin River, about ninety miles from Portage City. It

is the depot for the supplies used in the extensive lumbering business of the river on which it is located. According to the statement of the Wisconsin Correspondent, it contains seven hundred inhabitants, all engaged in the lumbering business. The chief lumbering localities are the Big Bull Falls, 46 miles north of this river; the Eau Claire Mills, on a stream of that name. There are twenty-five mills north of Steven's Point, many of which run three and four saws constantly, which, according to the correspondent of the Wisconsin, turn out forty million feet of lumber in the season. Big Bull Falls has a population of five hundred, who are all engaged in the lumbering trade. Vast quantities of shingles are made in this region. Large quantities of provisions and dry goods are consumed in this extensive district, all of which would be purchased at Milwaukee if a communication were once open between the two points. The La Cross railroad will effect a part of this desirable object.—North of Steven's Point is a dense forest of pine, ill-suited to agriculture, the land being too sandy.

CHAPTER IV.

When water is exposed to atmospheric influence, it is converted into vapor, which, from its levity, ascends. When this vapor is thus separated, the air holding it in solution, it is invisible, assuming either the form of clouds or mists, suspended in the atmosphere, or of rain, dew, snow, and hail falling to the ground- It is probable that electricity acts a very considerable part in elevating and depressing clouds and mists. When repelled by negative electricity the clouds ascend, and when mists are attracted by positive electricity they fall to the ground, regaining, in their descent, the solid and liquid form, by which, under the influence of gravity, they tend continually to a lower level, till the entire mass joins the ocean. The rain or snow that falls on the elevated parts of the country first forms, in its descent, rivulets, then streams, and ultimately rivers. The velocity and weight of the water, thus set in motion by the action of gravity, place at our disposal a power which may be applied to give motion to machinery. This application of water in motion is the simplest power which any of its condltions places at our command.

If all the rain falling on any district, passed to the ocean or any reservoir, and if its quantity and fall could be ascer-

tained, we could then easily determine the amount of me chanical force brought to act, in driving machinery of any kind. These data are but imperfectly known, even in the oldest country; and how much less do we know of such data in a new country, where the application of science to such matters is scarcely thought of. Mr. Lapham has a rain gage, and another is kept at the Beloit College, under the superintendence of one of the professions; but two are too few for so wide a field as Wisconsin. It is to be hoped, however, that the scientific gentlemen throughout the State, and more especially those connected with public institutions of learning, will see the necessity of co-operating at different poirts, simultaneously, with the view to collect data on which might be founded the solution of many philosophical problems of a highly interesting and practical character. The importance of the water power of this state is of such magnitude, in a national and industrial point of view, that I am induced to discuss it, not, of course, pretending to perfect accuracy, but rather to draw attention to the subject, and paint out in a general way, the circumstances affecting it.— The first thing to lead to the proper solution of the problem, which I mean to discuss, is the quantity of rain that falls in Wisconsin in a year, on an average. As rain gages have not been kept at different points of the State, I shall only assume what I think from common observation cannot differ very much from the truth. Mr. Lapham, of Milwaukee, has kept an account of the quantity of rain that falls in a year in the city, which he considers to be thirty inches. In Beloit, where the quantity that falls is also registered, it appears that the quantity which falls there exceeds that which falls at Milwaukee, by more than twenty-one inches. The mean quantity as derived from the two sour-

ces, the only reliable ones in the State, may therefore be taken at 40½ inches. The next thing to be discussed is the quantity of water absorbed by the earth and atmosphere.—As no observations have ever been made in Wisconsin to show the amount of evaporation and absorption, I must only take my data from other countries, where the quantity has been ascertained from a series of experiments long continued, with a view to arrive at as accurate results as the nature of the subject would admit. Mr. Dobson, of Liverpool, tried experiments there, and found that nearly the same quantity of water was evaporated from the surface of water as fell on it, in rain. Dr. Dalton, well known, from his high scientific attainments, in conjunction with Mr. Hoyer, tried experiments in Manchester, in order to ascertain the relative quantities evaporated from different surfaces, and they found that from the land the evaporation was 25.16 inches, and from the water, at the same time, 44 inches, the rain that fell being 33.56 inches.

Baron Dupin, of France, Dr. Thompson, of Great Britain, Mr. Fairbairn, of Ireland, and others, made numerous observations on the evaporation of water, and though the circumstances affecting their results were quite different, yet they came to the conclusion that about two-thirds of all the rain that fell evaporated, the other one-third making its way to the ocean. It is an ascertained fact that a greater quantity of rain falls here than in Ireland, where the evaporation is taken at two-thirds of the rain that falls on the surface, the other third being the only source of power to give motion to machinery, by its gravity and acquired uelocity.—Though the quantity of rain that falls in Wisconsin and Ireland is not very different, yet the quantity of water evaporated may be quite unequal, arising from different cond'

tions of the atmosphere and different qualities of the soil. In the absence of any direct observations on this subject in Wisconsin, I must only assume that which I consider to be nearest the truth, without pretending to perfect accuracy.— In consequence of the cloudy sky of Ireland as compared with the bright sky of Wisconsin, a less quantity evaporates there than here. Of 36 incher that fall in Ireland, 24 inches evaporate, and 12 are employed as a power. In Wisconsin 40½ inches of rain fall, and it is not too much to suppose that 28½ inches evaporate, leaving 12 inches to drive machinery. Now as the force of water is proportional to the height through which it falls, it is evident that the entire quantity of water, as well as the height through which it falls, must cnter as an essential element into the solution of the problem under discussion. The government report makes the number of square miles in Wisconsin 53,924, which being reduced to square yards, gives 167,934,982,400. All the rain that falls on the entire surface of Wisconsin in one year, amounts to this number of yards, 40½ inches high, but only 167,034,982,400 square yards 12 inches high are employed to produce mechanical motion; therefore, the entire quantity of water to generate power is 55,678,327,466-2-3 cubic yards. The next thing to be ascertained is the average fall through which this quantity passes. In Ireland this could be ascertained to as great a degree of accuracy as need be required; as in connection with the survey of the country, the altitudes of all the river courses, dividing ridges &c. were taken, by which the catchment basins of all the country may be seen almost at a single glance, and the average height, not only of each catchment, but of the whole Island, may be calculated. But in a new country like Wisconsin, it could not be expected that the limited time and

labor bestowed on such matters, could place at our disposal such facts in sufficient amount or detail as would be desirable, to lead to such results as could be depended on. In our present position we must only employ all the materials we can collect, and make the best use of them we are able, by which a step is made in the right direction, and something more left for our successors who are to push the subject still farther. *Dr. Owen and his associates took levels from the mouth of the Chippewa to the mouth of Bad river; from the outlet of Lake St. Croix to the mouth of Bois Brule rivlr; and from the Mississippi, at St. Pauls, to the trading house on St. Louis river, 18 miles above Fon du lac. Mr. Lapham has kindly placed in my hands, levels taken from Rock river, near Beloit, to the head of the Wolf river; also levels from Milwaukee to the discharging point of the Wisconsin river, at the Mississippi. With these limited materials, and assisted by the map of Wisconsin, I have endeavored to find an average elevation of the entire State, over lakes Michigan and Superior, and also over the Mississippi river, these being the recipients of all the water that falls on the surface of the State, employed to generate power. This altitude or elevation, I consider to be about 350 feet. The problem now under discussion has narrowed itself to the finding of the power generated by 55,678,327,466 2-3 cubic yards, falling through the height of 350 feet, in 365 days, or, 105,933 cubic yards in one minute. A cubic foot of water weight 62½ lbs. and a cubic yard 1687½ lbs.; therefore the weight of all the water that falls in one minute through 350 feet, is 178,761,937 lbs. The horse-power, therefore, is equal to 178,761,937×350÷44,000, which

*The numerous levels which have been taken through the State for Plank Road and other purposes, would afford good data for the solution of this problem.

gives 1,421,969 horse power, for the entire State, and which exceeds the water-power of Ireland, so celebrated for that, as well as for numerous other natural advantages. Where it is an object to economise power, the water is not allowed to escape during the idle hours; therefore, if we only take three hundred working days of twelve hours each, instead of three hundred and sixty-five of twenty-four hours each, the water-power of Wisconsin will be 3,460,124, distributed over the entire State. Now if we knew the structure of the country and the area of all the catchment basins, we could assign to each district, geographically, the portion of this power belonging to it, but with our present knowledge of the contour of the surface of the country, we can only approximate the truth. The dividing ridge separating the tributaries of Lake Michigan and the Mississippi river, gives to the latter about three fourths of the water that falls on the entire surface of Wisconsin, and to the Lake about one fourth; very little, comparatively, falling into Lake Superior. The water falling into Lake Michigan is principally contributed by the Fox and Wolf rivers, which pass through Lake Winnebago, and ultimately into Lake Michigan, by Green Bay. The water of Winnebago Lake in its passage towards Green Bay, affords considerable power at different points along its course, the most considerable, and surely the best circumstanced, being at the rising towns of Neenah and Meshasha, situated at opposite sides of Doty Island. When angaged in laying out the canal and other improvements at Grand Rapids, I measured the water-power there, and found it to amount to over three hundred horse power, and the amount of power at Menasha is not much less. The other principal outlet is at Milwaukee, where a river of that name and the Menomonee enter Lake Michigan together. Sheboygan, Twin Rivers, Racine, Manitowoc, and others of lit-

tle note, are also contributors to Lake Michigan. There are numerous streams from the west side of the dividing ridge, running towards the Mississippi, the principal being the Wisconsin and Rock Rivers. The drainage of many districts for agricultural purposes, and the maintainance of navigation, may be adverse to the perfect economy of power. Numerous places having plenty of water may, notwithstanding, possess very little available power, the fall not being suited to mechanical purposes. In the best circumstanced situations, there is a loss of power in working every description of machines, by means of water, amounting, generally, to a third; but withal, we possess an abundance of water power to develop the manufacturing resources of our State on the very largest scale. In contrasting the expense of water power with that of steam, the former has much the advantage, being vastly cheaper than steam at the very mouth of the coal-pit. This is practically illustrated on a large scale, on the Shawe's Waterworks in Scotland, where each horse-power, by water, "costs upon the whole 5l 5s 5d being 30l 13s 7d less than the cost of one horse power by steam, at Glasgow."

In discussing the comparative cost of water and steam power, Sir Robert Kane writing on this subject says:—"Thus, whether we take Mr. Bateman's value, which is for the bare supply of power, or Mr. Thom's value, which includes the delivery of the power in a working form, we see that the cost of the water-power is not more than one-tenth of the cost of steam." In this statement Sir Robert has reference to Shawe's water at Greenock, in Scotland, which was collected from the surrounding country at a vast expense by which its cost as a power must have been considerably increased on the manufacturers as compared with power derived from a natural stream of running water, which

nothing. Possessed of an amount of water sufficient to drive any quantity of machinery, and that distributed through every part of the State; and possessed also of an immense quantity of wood, as a source of heat, the absence of coal will not be very seriously felt for many years to come, in some localities, at least, and more especially when our navigable rivers and lakes render the article accessible, should its use at any time become indispensable. Though almost all the rivers and streams distribute mechanical power to most parts of the State, yet there are localities without any, where the demand for certain articles of manufacture may render power of some sort necessary. In such locations steam is indispensable. It is sometimes supposed that a water-wheel cannot produce such a smooth and equable motion as to act with as full effect as a steam engine. This is a mistake, as I shall show by transcribing an article on this subject, by Scott Russel, inserted in the Encyclopedia Britanica: "Mr. Lucy had constructed at Birmingham a flour mill driven by steam, and it has been his object to obtain perfection without any limitation of expense. He had got one of Bolton & Watt's steam engines, and yet he found that his mill neither produced such perfect flour, nor moved so smoothly as mills driven by water. On the contrary, it was foued that the irregularity of the motion produced a larger quantity of course than of fine flour, at a mercantile loss to the owner; and it was likewise found that the irregular propulsion *a tergo* intervening with the uniform motion, towards which the millstones tended to their own momentum, produced a clanging reciprocation along the whole line of toothed gearing, which was most injurious, and rapidly destructive to the toothed wheels. When we visited the spot in 1838, the ruins of former wheels, most unequally worn and totally destroyed,

were strewed about the yard. The usual plan of increasing the weight of the fly-wheel was resorted to without success; and Mr. Lucy applied to Mr. Bucklė to propose a remedy for the evil. This remedy Mr. Buckle found in the very simple contrivance of a pneumatic pump. So perfect was the action of this mechanism that the fly-wheel had been wholly removed, and the engine and the whole mill-work were moving in the most smooth and effective manner. It was found that the change enabled them to give all the grinding stones a greater velocity than formerly, so that the quantity ground was greater in the proportion of 52 to 56, and the quantity of the finest, or first flour, from the same wheat, was likewise much increased; so that both by quantity and quality, the owner of that mill was now enabled to command the market. The same motion has subsequently been applied to cotton mills with perfect success, the quantity and quality of yarn produced being much improved." From what I know myself of the application of water and steam power to the coarsest as well as to the most delicate description of work, the former, in every case, is found to be not only much cheaper, but much more delicate and exact in its movements than the latter. For both these reasons, in England, where coal is so cheap and abundant, water-power is invariably used whenever it is at all available.—Where water is scarce its economy is secured by the construction of reservoirs, which, during wet weather, store up spared power to be used in dry weather, when there is an insufficiency of supply. Another mode of maintaining an adequate power, when a deficiency of water is found to exist, is to make up the deficiency by adding a steam engine, which can at all times be worked with the water-wheel.—This mode of maintaining any required quantity of power

is resorted to in many places difficient in the supply of water. Two steam-engines of one hundred horse power, and two overshot wheels may be seen working together at the great cotton factory in Portlaw, in Ireland. In such cases a small amount of steam-power is required to compensate for the deficiency in the supply of water, while no assistance at all is required from the engine, so long as the supply of water is, of itself, sufficient. Without the co-operative assistance of steam in places similarly circumstanced as Portlaw, the water should run waste when it became insufficient, or the work should be suspended till a sufficient supply of water was procured; but by the application of steam in conjunction with water, the full economical value of the latter is retained, while the steam-engine may rest altogether when the water is, of itself, sufficient to perform the duty. Ireland is supposed to possess a greater amount of available water power than most countries of equal extent, partly on account of the moisture of the climate and the inequalities of the surface, which give rise to numerous springs that traverse the country in every direction. The country is likewise studded with high mountains and peaks, which give the rivers and streams a considerable fall, which favors the employment of water wheels to communicate motion to mill machinery. This will appear from a comparison of the average height of Ireland, which is 287 feet, with that of Wisconsin, which I estimated at 350. The area of Wisconsin being over once and a half that of Ireland, the available fall to generate power is more gradual in that, and therefore less favorable to turn water-wheels than in Ireland. This disadvantage added to the small average height, as compared with Ireland, tells somewhat against the industrial effect of the water power of Wisconsin. To compensate

for this disadvantage, however, we use in Wisconsin a description of water wheel which is entirely unknown in Ireland, except as an object of mechanical science. This is the reaction wheel, which works under a two foot head of water. This property renders the re-action wheel fit for streams having very moderate falls. The trifling cost of this wheel adapts it to the pockets of most new comers, to whom even a small saving is a matter of some consideration. In Great Britain and Ireland the wheels employed to communicate motion are the overshot wheel, the breast wheel, and the undershot wheel. Their usual effects are in the order in which they are written. The overshot wheel when well constructed, gives a working effect of eighty per cent., and in general, its useful effect is not under 75 per cent. Wherever there is an available fall the overshot wheel should invariably be preferred. Practical men recommend the use of this in every case where the locality affords a fall varying from fifteen to fifty feet. In sluggish streams, affording much water, but little fall, the undershot wheel is adopted, by which a loss of power is sustained equal to two-thirds of the water expended, the available useful effect being only one-third of the quantity expended. From the great quantity of power lost, this wheel should never be used if any other could be exployed. Its use is limited in Europe to streams having a fall of from two to six feet.—Streams having a fall of from six to fifteen feet are adapted to the breast wheel, which gives a useful working effect of about fifty-five per-cent. of the water expended. On the continent of Europe, especially in Bavaria, a water-pressure engine is often used in localities having a fall exceeding fifty feet. Its working effect is somewhat similar to that of the overshot wheel. Where the fall is so great as to render it

unfit for any of the wheels already mentioned, the water-pressure engine is available. Barker's mill, which acts on the principle of re-action, communicates motion with considerable advantage, where the fall is considerable and the quantity of water limited. Its useful effect is between one-half and one-third of the water expended. The last I shall mention is the re-action wheel, so generally used in this country. Its use is forced into practice by necessity, which indeed often gives rise to numerous inventions peculiarly adapted to existing circumstances. It may be adopted in its modified forms to situations quite unsuited to the overshot wheel, while it may be substituted for the undershot wheel with much advantage. This wheel gives from sixty to seventy per cent of useful effect, and besides its adaptation to extreme cases, its first cost is comparatively but a trifle. A wheel capable to move one run of stones costs about four hundred dollars, while a re-action wheel costs only thirty dollars. One run of stones will grind twenty bushels in an hour, making two hundred revolutions in one minute. In America the stones are comparatively of small diameter, but their execution is great, owing to the quick velocity with which they move. Having paid much attention to those practical sciences bearing on the subject of machinery, I should willingly devote more time to the discussion of water wheels, were it not inconsistent with the intended limits of the work, and with its intended purposes. As I am upon the subject, it may not, however, be considered out of place to mention that water might be collected in many localities, at a very trifling cost, sufficient to drive a large amount of machinery and supply towns and cities for all domestic purposes. Both these ends have been accomplished in a remarkable manner by Mr. Thom, at Greenock, in Scotland, where

that Gentleman, at a comparatively small expense, collected together from the surrounding country, a quantity of water capable of producing 2000 horse-power, besides supplying the town with plenty of water. All this he accomplished, by making an artificial lake or reservoir, commanding the town, into which the rain-water of a large tract of country naturally collected. Many towns are so circumstanced as to take advantage of the plan adopted by Mr. Thom, at Greenock, without incurring much expense.

When a catchment basin could be formed to command a town or city, and supply it with plenty of water, it should invariably be done in preference to resorting to the expensive mode of supplying it by means of steam engines, which require fuel and attendance—two expensive items, to which might be added the expense of wear and tear of machinery.

CHAPTER V.

Although I am very far from undervalueing the great facilities afforded by Wisconsin to prosecute the various branches of manufacturing industry; yet, circumstanced as the country is at present, her population must derive its chief support from agricultural pursuits for many years to come. The country is yet too young, and the population too thin to carry on any branch of manufacture on a scale sufficiently large to be remunerative; therefore, a departure from the legitimate business of new settlers, who, for the most part, were farmers in the old country, would be unsafe and unwise. I would not like, however, it should be supposed that I am unfavorable to the introduction of such branches of mechanical industry as may suit the wants of the State, should its present condition enable it to do so. But I apprehend that, at present, the general mass of the people had better turn their attention to the improvement of the soil, from which. for many years to come, they are to derive their principal support. I should like, however, to see the necessary branches of mechanical industry keep pace with the growing wealth of the country, and also with the consequent demand for articles of taste and luxury, as well as of usefulness. There is nothing in the one occupation that is

incompatible with the success of the other. The farmer cultivates his crops to the best advantage where the industrial arts are in a flourishing condition, and every description of trade prospers just in proportion to the improving condition of the surrounding agricultural population. With us the primary elements of prosperity are in the soil, and only require the strong arm of labor and agricultural skill to render them productive. Agriculture is the source of that bountiful stream, which, in its course, nourishes every department through which it flows. It is the very life-blood of the human race. With it every new country must commence; without it, no new country can prosper. The importance of the subject, in all its bearings demands more than a passing notice; and though it would be inconsistent with the intended limits of this work, as well as the general plan I had in view, to enter upon a regular discussion relative to the various modes employed in the practice of agriculture, yet I feel constrained to point out some glaring defects in the mode adopted by most of the Wisconsin farmers, and throw out a few hints calculated to lead to a more improved system, not only as regards the cultivation of the soil, but also as regards the general economy that ought to guide them in all their financial arrangements. It is said by a modern writer of eminence that "If agriculture is ever to be brought to that comparative state of perfection to which other arts have already attained, it will only be by availing itself, as they have done, of the very many aids which science offers to it." Though this is a truth which scarcely any one will deny, yet how very few, even in a whole state, ever think of calling in the aid of that unerring guide in the 'management of their farms.— How few even think of acquiring a knowledge of even

the bare elements of those sciences so essential to the economical and successful working of the farm, much less of serving an apprenticeship, though it is the invariable practice to do so in other arts and trades, not near so difficult to learn. The tailor, the hatter, and the shoe-maker serve a long appreniiceship to acquire a knowledge of their respective trades; but no one ever scarcely thinks of serving a single week to a branch which requires a high degree of practical and scientific knowledge. This ought not to be so. It might appear strange that a branch of human industry coeval with his race, and upon which the very existence of the human family may be said, at all times to depend, should not have been brought to its ne plus ultra of perfection many ages before this. In all ages since the creation, man has been incessantly employed in tilling the ground, with a view to raise from it the necessary food for his support; and in proportion to the increase of population, and consequent scarcity of land, it became his duty to raise, from a given extent, the greatest quantity of useful produce, without permanent injury to the soil, and with the least expenditure of labor and cost. In some of the nations of antiquity, a scarcity of the necessaries of life was often experienced, arising from various causes, which, of course, imposed on them the necessity of increased exertion both of skill and labor, as regarded agriculture. It has, however, been reserved for modern science to effeet an improvement in that art, which our fathers could not have contemplated. They have transmitted to us their practical experience, to which we have added the numerous facts collected from the sciences of Geology and Chemistry, which are comparatively of modern date. Our fore fathers, no doubt, from repeated trials, were aware of many of the obvious qualities of the soil, favora-

ble or unfavorable to vegetation; but were totally unacquainted with numerous others which lie dormant until awakened into activity by the application of proper stimulants, pointed out by science. The science of Geology facilitates the labors of the agriculturist, by pointing out the origin of soils, the causes of their diversity, their general character, the benefit or injury resulting from their admixture, the changes which are constantly taking place on the surface of the earth, arising from mechanical and chemical causes, and a vast quantity of other information, which, but that science alone, can impart. The scince of chemistry enables him to ascertain the elements of which all organized substances are composed, the different proportions in which these elements enter into the composition of each particular substance, to analyze the various soils, with a view to ascertain the quantity of suitable food afforded by each for the nourishment of plants, and supply the deficiency, if found to exist, by the application of proper manures in adequate quantities. By the aid afforded by the sciences of Geology and Chemistry, the scientific farmer is conducted to results which he never could have arrived at by any other means; and the perfection of his art, which is still in great want of further improvement, is only attainable by combining with practical experience the assistance afforded by science. It could not be expected that every farmer could be a geologist and chemist, but the outlines of these sciences ought, doubtless, to form a part of the system of education adopted in all our high and common schools, by which a taste would soon be formed among enlightened farmers, the advantage of which would at once be felt and appreciated. It would, for instance, require but a short time and a small amount of intellectual exertion, to learn the names of the

common rocks of the country, which, so far as the farmer is concerned, are very few in number. He might be told that the loose soil, which, in general forms the surface of the globe, has been derived from those rocks; and that the soil is fruitful or sterile according to the rocks from which it had its origin. The intelligent farmer could soon learn the general outline of this science, by which he could see its direct bearing on practical agriculture. For instence, he would find it useful to know the constancy in the relative position and character of the stratified rocks, the general character of the soil upon them. He would likewise find it useful to know the quality of soil derived from the unstratified rocks, such as the granites and trap rocks; also the physical character of the transported sands, gravels, and clays; and the relation between the nature of the soil and the kind of plants that naturally grow upon it. The effect of temperature on the growth of plants is a fact with which the practical farmer ought to be acquainted. 'Altitude, climate, and other local circumstances exercise an influence affecting the vegetation of every country, which is perhaps more obvious to the senses than any other cause, and which ought to form an item of the practical farmer's knowledge.

The chemical constitution of the soil and growing crops is a subject that may require a man's life lime to learn; but a great deal of what would prove highly useful, in after life, may be learned at school or college, in a few months. The agriculturist ought to know that the growing crops and the soil in which they grow are composed of certain organic and inorganic substances; that the substances which contribute to the growth, nourishment, and support of his crops, are derived from the soil and atmosphere; that different plants take in these substances in different proportions, and are

supplied by different soils in different proportions. And, although every farmer could not be expected to be able to make a chemical analysis of every soil and every crop, in order to ascertain the exact proportion in which the different substances enter into the composition of each plant, and the quantity present in each soil; yet, by learning a little of the outlines of the science, he will be enabled to perform many experiments, at the expense of a few cents, which could not fail of proving useful and interesting. Knowing when acids or alkalies are in the soil in too great abundance, the scientific agriculturist will, at once, know the proper remedy to be applied in order to neutralize the injurious effect of the prevailing substances. Knowing, also, that the soil is deficient in some of those substances that are required to feed his plants, he will supply the deficiency by the addition of proper manures in sufficient quantities. By founding his practice on this principle, he will be the less liable to fail in any new experiment he may make to increase the produce of his land; he will also be more likely to succeed under varied circumstances, as regards soil and climate.

A farmer may be very successful in one locality, from long acquaintance with the habits of the soil and climate, and be totally at a loss how to proceed when both are different. Indeed, similar soils in two different climates may require different treatment; and he who is guided by principle will feel no hesitation to alter his mode of treatment according as the circumstances of the case may require; while the person whose guide is habit, cannot see why he should adopt a different mode of treatment from that which he always found to answer. This person, who may be termed a local agriculturist, will doubtless be disappointed, while that man whose practice is founded on principle, combined with experience,

will succeed; being what may be termed an universal agriculturist. He who knows a little of the geological structure of the crust of the globe, and of the chemical constitution of the different soils, will not find much difficulty in forming a correct judgment of the capabilities of any particular soil from its external character, and from the plants it naturally produces. Would it not be well, therefore, to afford the rising generation an opportunity of acquiring a knowledge of such importance to the State, by either establishing agricultural schools, or making agriculture a component part of the system of instruction adopted in all our common schools and colleges throughout the State?

I hail, with much pleasure, the organization of agricultural societies in many parts of our State, which cannot fail to arouse public attention to a department of our resources, on which mainly depends the future prosperity of our infant country; which, from its situation, soil and climate, contains all the elements of future greatness, if but properly developed. I am glad to find that an appropriation of $3,000 has been recently made by the legislature to aid the agricultural societies.

The absence of extensive swamps, spreading their deadly influence far and wide, and the proximity of our ocean lakes, moderating our climate, and preventing those extremes of heat and cold, which act so injuriously on animal and vegetable life in other places, are blessings which we do not duly appreciate. The peculiar contour of the surface, giving facility of drainage to every district, while its undulating character gives rise to numerous springs that send forth, in every direction, streamlets, through the channels of which flows the very life-blood of agriculture. And the union of two or more of these streamlets, by the unevenness of the surface,

creating sufficient power to drive the machinery used to convert the produce of the soil into food for man and beast, are circumstances highly favorable to the agriculturist.

With all the advantages pointed out in the preceding pages, Wisconsin farmers have no reason to complain of the want of an easy, expeditious and cheap mode of transmitting the produce of their farms to a good market. With all these advantages, and with a hardy, industrious and active population, the State of Wisconsin may look forward with confidence to be able to compete with the most favored State of the Union. Nature has done her part, by giving us a soil of unsurpassed fertility, with a surface of endless variety, rivers and lakes of crystal purity, and a sky free from hazy fogs and drizzling mists, and it only remains for us to convert all these natural advantages to some useful purpose.

At present, this State derives her principal resources from the soil, and, as I have stated before, must continue to do so for some years to come. It is, therefore, the duty of all to contribute, in one way or other, to the improvement of that art, trade, or business, from the exercise of which we derive our chief support. And it is a strange fact, that, though agriculture must have been the first business in which man was engaged, and therefore the oldest trade, nevertheless few trades are less understood. For thousands of years, the same invariable practice was pursued in the old country, as regarded the raising of stock and the cultivation of various crops—the son never daring to deviate from the practice of the father in such matters. Ignorant of those sciences that bear directly upon animal and vegetable physiology, the farmer could make no advance towards an improved system. And if he happened to hit upon an improved mode of management, it was the result of chance, not of scientific investigation.

It is not so at present in many parts of the State. Guided by the sciences of chemistry and geology, we can try more experiments, leading to useful results, in a few hours, than our forefathers, unaided by such lights, could effect in as many centuries. Encouraged by the certainty of success, under the guidance of science, men of education in every part of Europe and America turned their attention, sometime since, to the improvement of agriculture. Men of wealth and influence soon formed themselves into societies to encourage the successful experimentalist by the bestowal of honorary and pecuniary rewards; and thus instructed and encouraged, the farmer no longer treads in the footsteps of his father, but following the advice and example of enlightened practical men, he adopts a system which amply rewards him by an increased amount of produce quite unattainable under the old system of management.

I am happy to see the State of Wisconsin following the laudable example set her by her older sister States. The agricultural societies already formed, and those in progress of formation in many parts of the State, must be productive of much good.

The show fairs for the exhibition of improved breeds of stock and implements of husbandry; of different specimens of plants, fruits and flowers; of works of art and of agricultural produce of every kind, cannot fail to excite a spirit of rivalry, which must necessarily tend to the general good of all. Any suggestion having for its object the improvement of agriculture, should be extensively circulated; and the medium through which useful knowledge is communicated ought to be encouraged by all whom it may concern. He who suggests a plan by which "two blades of grass may be grown, where only one had been raised before, is a useful benefactor;"

and he who communicates information to the public is no less useful. Hence it appears that an agricultural publication in one or two parts of the State, to give publicity to the proceedings and reports of societies and individuals relative to agricultural improvements, ought to receive public support.

In this age of progress, we must keep pace with our neighbors, if we wish to take advantage of those natural resources so abundantly placed before us in every part of the State. If we neglect this duty, we shall be left far behind. Having expressed my opinion that Wisconsin must chiefly depend on her agricultural resources, for many years to come; therefore it becomes the duty of every farmer to pay due attention to the cultivation of those crops that pay best, and are least liable to injury from the effect of climate or other existing causes. He is also bound to try other branches of farming, when they promise a larger and more certain return for the outlay of capital and labor bestowed on them. For the last two or three successive years, we have suffered considerably from the failure of the wheat crop, which has crippled the farmers considerably, but the abundant harvest of the present year (1853) and the unusually high prices of produce of every description, have revived their drooping spirits and placed them in comparatively affluent circumstances, which is visible by the number of shanties which are being replaced by comfortable and sightly frame dwellings in every part of the State. Should we be blessed next year with such another harvest as that which has passed, our farmers and the State in general will occupy an enviable position among the States of the Union.

Having stated, more than once, that the future prosperity of the State depends, in a great measure, on the attention

paid to improved modes of husbandry, which consists chiefly in deep ploughing, thorough draining, and due attention to cleaning, manuring, and providing good seed, a few hints upon these subjects may not be considered out of place. The following facts in relation to the habits of plants, will show the necessity of deep ploughing or digging.

It is a fact not generally known that plants, in general, send their roots to a greater depth than is generally noticed, when not obstructed by some hard or impenetrable substance. Turnips are known sometimes to send their fibres to a depth exceeding two feet, while they extend themselves in a lateral direction upwards of four feet from the bulb. Wheat, oats and grass-seed send forth some of their roots to a depth of more than twenty or thirty inches; bean and clover roots penetrate the soil to the depth of three feet; and flax, two feet and a half. A gentleman, who devoted much of his time to agricultural pursuits, told me that he traced bean and flax roots to the depth of forty-two inches.

I state these facts to show the necessity of working the soil to a considerable depth for the reception of what are termed surface roots. Though it forms no part of my plan to enter into a detailed description, either of the actual methods now adopted in the agricultural operations of Wisconsin, or of the propositions now under discussion for the general improvement of that great branch of human industry, yet the time will not be spent uselessly, which I mean to devote to a department that seems to have been overlooked in this State.

Thorough draining, so for as my observations go, has never received any share of attention in Wisconsin; neither have I seen any attention paid to subsoil ploughing, manuring, or weeding. The high rate of wages and the low price of land in this State, induce farmers, in general, to till extensively

rather than well; but the farmer desirous of reaping a plentiful harvest must, in the first place, be particularly careful to retain no more water in the soil than is essential to vegetation; a greater quantity being invariably injurious.

His land being dry, his next care should be to enrich it with manure, without which an abundant crop cannot be expected where the soil is, in any degree, exhausted from previous cropping.

Draining and deep ploughing being attended to, the next duty that devolves on the farmer is, to keep his land clean. These principles must be always kept in view. Any of them being neglected proves injurious. Manure is thrown away, to no purpose, on land (especially in cold climates) containing an excess of water, which never fails to diminish the fertility of the soil, and encourage the growth of coarse grasses and useless weeds. This is so well understood in Great Britain and Ireland, that the thorough draining of the land is particularly attended to by every one deserving the name of an agriculturist. When the ground is not kept clean, weeds encroach upon the useful plants, very often gaining the ascendancy by extracting from the soil an undue proportion of nourishing juices, which should be reserved solely for the use of the growing crop intended for consumption. When noxious weeds are allowed to grow up among grain crops, or vegetables of any kind, they deprive them of their due proportion of light and air, which are essential to their growth and perfection. The same remark applies to pasture and meadow land, which should be kept dry, manured and clean. I have seen useless weeds in many parts of these western states occupying the place of the sweetest herbage, after having smothered it altogether. This should be prevented by checking the growth of such weeds before their number and

size become injurious. Formerly, few persons, even in the old country, understood draining upon scientific principles. The plan then pursued was both expensive and inefficient, owing, no doubt, to a want of knowledge of the geological formation of the earth's upper strata.

A proper knowledge of the cause producing excessive moisture, frequently saves time, labor and expense; as a single drain made in the proper place and direction, may effect more than ten made without reference to the producing cause. Rain water is retained either on the surface, where it evaporates, or penetrates to a lower level, through beds of sand, gravel, or other permeable substances; and at some small distance beneath the surface, meeting an impenetrable bed, it flows through the porous stratum, which usually terminates at, or near the surface, and at which point it escapes, spreading itself over the surface in all directions, where the land is lower than the point of escape. While the water remains far under the surface, it does no injury ; it is, therefore, the business of the drainer to check its progress before it reaches the surface, by confining it to some channel from which it may be carried away through some convenient outlet. These observations will be easily understood, by referring to the diagrams in my treatise on thorough draining. When the swamps and many of the shallow lakes throughout the State shall have been drained, a considerable area will be gained for Agricultural purposes, and much water-power created, by being collected into narrow channels, instead of being spread over a large surface, from which only a part would evaporate, and the rest remain to the great injury of the soil.

The absence of high Mountains extends the area of Wisconsin for Agricultural purposes, while the height of moun-

tains and peaks in many other countries places them above the range of vegetation; the highest of the mounds of Wisconsin is below that range. The few swamps it contains command a sufficient fall for drainage, and the limited quantity of inferior quality of soil is covered with pine and other forest trees, which, at all times, must command remunerative prices in the market, and be otherwise useful for domestic purposes. So it might be said of the State of Wisconsin that every acre of its surface is available for some profitable purpose.

In connecting with this notice of the actual circumstances of the surface of Wisconsin as regards Agricultural capabilities, the important question of how its powers may be augmented and protected from that impoverishing effect of cropping, invariably observable in lands under unskillful cultivation, it may be necessary to show that the action of plants upon the soil has this deteriorating tendency. A plant receives all its nourishment from the soil in which it grows, and from the atmosphere; and if we analyze the plant, we shall readily find what it has taken from the soil. If the soil thus deprived of a certain proportion of nourishing ingredients should not contain the necessary nourishment for another crop, the deficiency must be supplied by manuring; otherwise the fertility of the soil will continue to diminish, and every successive crop, from the diminution of the necessary food for its support, will necessarily diminish, at least in quantity, if not in quality. Hence it appears that, to keep the soil in good condition and raise a good, healthy, productive crop, a perfect knowledge of the constituent parts of both is essential.

In like manner, in applying vegetable substances to the feeding of animals, it is of equal importance to know what they severally contain; as then the science of Chemistry and

Physiology would enable us to make a selection of the food best suited to the individual. The three great divisions of Nature are co-relative and mutually compensating. Plants derive their food partly from the earth—animals theirs from plants. Animals and plants die, and return their elements to the soil, which sends them back in the same order as before; hence everything in nature is referable to some one or other of these three divisions. All plants and animals are composed of sixteen elements, the chief being carbon, hydrogen, oxygen and nitrogen; carbon being a solid substance, and the other three gases. The remaining elements, though usually present in small quantities, are no less essential to the healthy condition of the growing plants. The great duty of the farmer, then, is to ascertain the composition of the soil, and the action of the plants upon it. As the farmer could not be supposed to be able to make a chemical analysis of the soil, it becomes the imperative duty of the State to supply it. Scientific gentlemen connected with the public institutions of learning, would be the most fit persons to undertake this task. Professor Hitchcock furnishes a most valuable table, by which a comparison can be instituted between the soils of Wisconsin and Massachusetts. This comparison is, of itself, sufficient to prove the productive quality of the former:

	Massachusetts.	Wisconsin.
Average quantity of organic matter, (soluble,) - - -	3.90	4.90
Average quantity of inorganic matter, (insoluble,) - - -	3.70	5.13
Average specific quantity of soil,	2.44	1.84

From an inspection of this table it will readily appear, that the quantity of organic matter in the Wisconsin soil far exceeds that of the Massachusetts, while its specific gravity is very much less.

In looking over the analysis of the soils of Wisconsin and Massachusetts, by Dr. Owen and Professor Hitchcock, I find in every case, that where the specific gravity is small, the organic matter in the soil is invariably large; from which we may infer the quality of soils by their specific gravities. This, however, though forming a sort of clue to the quality of soil, may bring us to conclusions not in all cases satisfactory.

Analysis of a sandy soil collected above the mouth of the Chippewa, by Dr. Norwood:

Water,	1.02
Organic matter soluble in carbonate of ammonia,	1.75
Organic matter, insoluble,	0.25
Insoluble silicates,	93.00
Peroxide of iron,	1.65
Alumina,	1.22
Carbonate of lime,	0.10
Phosphate of lime, not appreciable,	0.00
Carbonate of magnesia,	0.01
Alkiles, not appreciable,	0.00
Inorganic acids and loss,	1.00
	100.00

From this table it appears that a soil containing only two per cent. of organic matter, with ninety-three per cent. of insoluble silicates, less than four per cent. of soluble saline matter, consisting of oxide of iron and alumina, and only a mere trace of calcareous earth, holds out no great prospect to the farmer. It is, however, right to mention that this district produces crops far better than I could expect from a combination of such materials.

Analysis of soil derived from the decomposition of the Lower Magnesia Limestone at Eau Golli:

Water,	2.50
Organic matter,	8.20
Silicic acid, dissolved by chloroydzic acid,	0.04
Carbonate of lime,	0.80
Magnesia,	0.32
Oxide of iron,	2.68
Alumina, dissolved by chlorodic acid,	3.04
Alumina, dissolved by sulphuric acid,	1.00
Alkiles,	0.00
Phosphate of lime and iron,	0.01
Insoluble silicates,	77.10
Inorganic acids, combined with above and loss,	4.23
	100.00

An inspection of this table will readily show how much better the soil derived from this rock is than that exhibited in the preceding table. It is rich in mineral salts, which give rapidity to growth and durability to the soil: while the table of the sandy soil above the mouth of the Chippewa, above exhibited, gives only two per cent. of organic matter, this gives 8.20 per cent., besides 1.22 per cent. of salts; the sandy soil giving scarcely four per cent. of saline matter. This soil is also richer in the carbonate of lime than that.

An analysis of the soils resting on the different rocks of the State would be a valuable acquisition to the agriculturist; as upon it he would soon base a system which would be much more profitable than any that he could derive from bare observation.

Having introduced the constitution of soils, it might be well to state that they consist of two parts: the one organic,

which can be burned when the soil is heated to redness; and and the other inorganic, which is fixed in the fire, consisting entirely of earthy and saline substances. The organic part of the soil is the remains of animals and vegetables, which had once lived and died, and which have been spread over the surface of the ground by rivers, rains and other agencies. These substances add to the natural fertility of the soil. In different soils, these organic substances exist in different quantities. In peaty soils it forms from 50 to 70 per cent. of the weight, and as much as 25 per cent. is found in rich, long cultivated soils; but, in general, it is found in much smaller proportions, even in the best arable lands. It is known that oats and rye will grow in land containing only 1½ per cent.; barley will grow in soils containing from 2 to 3 per cent.; but a good wheat crop will require from 4 to 8 per cent. From 10 to 12 per cent. is found in some clayey soils. In gardens long cultivated, and all pasture lands, the entire of the upper part of the surface is composed of organic matter, which yields to the plants ulmic, humic, geic, cromic, and apocrenic acids. When animal matter is present, ammonia is produced by the decaying process of organized substances.

Besides the important office of supplying the growing plant with these substances, the soil supplies also a considerable quantity of inorganic matter, such as saline and earthy substances, which are liberated or set free during the decay of the organized plant. When we analyse a crop and discover that, in a healthy state, it contains certain proportions of organic and inorganic substances, then, if upon examination a soil is found deficient in any of these substances, whether organic or inorganic, the deficiency must be added, otherwise a good crop cannot be expected. The surface soil of every district is composed of these organic and inorganic substances,

mixed together in various proportions, which act upon the plant injuriously, or otherwise, according to the deficiency, or to the quantity present in the soil of some of these substances. The subsoil is variable in quantity and quality, and exercises a very important part in the production of crops, as is well known to every intelligent farmer. The physical properties of the subsoil, in connection with the effects of climate, affect vegetation in a very high degree. The effects of climate upon the upper soil is also very great. Some soils are dense and others light. Sandy and marly soils are the heaviest, and peaty soils the lightest. Some soils absorb more moisture than others, and retain it longer. Peaty soils absorb most, and sandy soils least. Strong clays absorb and retain nearly three times as much water as sandy soils ; hence the necessity of draining peaty and clayey soils.

The capilary attraction of soils influence the growth of plants. The different capacities of soils to lose water by evaporation affect the growth of plants. In dry weather plants would be burnt up in a sandy soil, while they may prosper in a soil retaining moisture. On the contrary, plants may flourish on a sandy soil in wet weather, while in a soil retentive of water, they would perish, or at least would not be productive as in clayey and peaty soils. Shrinking or diminishing in bulk is another property of the soil, which has some influence on the growth of plants. Clayey and peaty soils shrink most, and sandy soils least, if at all. In dry weather this property of the soil acts most injuriously on the growing plants. The soil, in shrinking, grasps the tender roots, and often squeezes them to death. Hence the utility of mixing sandy and gravelly soils with stiff clayey soils. The sand or gravel prevents the squeezing tendency of the clay to injure he roots by compressing them, and admits the air also, which

would otherwise be excluded. In dry seasons, peat or clay, mixed with sandy soils, improves them by making them absorb more moisture from the atmosphere, and retain it longer. Different degrees of heat exercise a considerable influence on vegetation. A wet soil takes a longer time in acquiring a degree of heat sufficient to produce vegetation than dry soils. Hence the necessity of thorough draining. Color also enters into the functions of vegetation. Blackish vegetable mould, and dry sand, and clay, become heated to nearly equal degrees, by exposure to the sun during equal times.

Besides a knowledge of those physiological properties of the soil, its chemical composition must be understood. Professor Johnson very properly says, that soils perform at least three functions in relation to vegetation. "They serve as a basis in which plants may fix their roots, and sustain themselves in an erect position ; they supply inorganic food to vegetables at every period of their growth, and they are the medium in which many chemical changes take place, that are essential to the right preparation of the various kinds of food which the soil is destined to yield to the growing plant." I have said, in one of the preceding pages, that when a plant dies, its elements, under the influence of chemical affinities, are reduced to a blackish mould, chemically termed humus, or ulmic. Sir Robert Kane says, that when perfectly pure, this substance contains no nitrogen, and consists of, as prepared :

	From Wood.	From Sugar.
Carbon,	72.7	65.65
Hydrogen,	6.1	4.28
Oxygen,	21.2	30.07
	100.00	100.00

This material is destitute of any power on vegetation. In the process of the decomposition of vegetable matter, it

evolves carbonic acid, and absorbs oxygen from the atmosphere, as also a considerable quantity of nitrogen, which enters into the constitution of the new product, which finally acquires almost the composition of an animal substance, as may be seen under. This new product is termed nitrogen.

	Nitrogen.	Flesh.
Carbon,	57.20	55.20
Hydrogen,	6.32	7.00
Nitrogen,	12.20	16.89
Oxygen,	24.28	20.90
	100.00	100.00

The decomposition of this nitrogen, when in contact with air and moisture, is similar to that of animal bodies. The roots and fibres of plants left in the ground to rot, by a similar chemical process, form food for the next generation of plants.

A certain relation exists between the soil and the plants that grow upon it; a fact well known to the most unobserving farmer. While one description of soil will yield an abundant crop of wheat, another description will refuse it any sustenance whatever. While pine timber will grow naturally on one soil, beech will be the natural growth of another.—The mountain top will naturally grow heath or moss, but when abundantly limed, these are displaced by natural grasses or daisies. Hence it appears that the seeds lie dormant in the soil, till they are awakened into vital existence by the presence of the food necessary for their support. If this doctrine be denied, there is no alternative left but spontaneous existence. When any soil denies to the plant sufficient food for its support, it dies off and is succeeded by a different plant, whose wants can be supplied by the food still remaining in the soil, adapted to its nature.

It has been stated before that the natural operations of nature point out the necessity of a regular rotation of cropping. The analysis of different crops show, that one crop takes away from the soil a certain quantity of food; another extracts a certain quantity of another description, leaving still plenty for the support of a third crop, different from the other two. Here it may be seen that the same soil may amply supply three different crops, while the same crop perhaps might grow but indifferently the second year, and die off the third for want of sufficient food for its support. Hence the necessity of manuring the soil specially for particular crops.

But following nature, a more economical plan might be adopted; namely, a proper rotation. Science points out the best rotation, which books on agriculture will describe. As well as the same soil, to be economically worked, requires a proper rotation of crops, so likewise does it require the same seed to be changed as often as possible. Every farmer is aware of the utitity of this practice.

In order to illustrate some of the statements made in the preceding part of this work, and also to shew the great advantage of a superabundant supply of certain substances—to prolong the agricultural capabilities of the soil, and restore it when worn out by injudicious tillage, I subjoin the composition of three different soils, as determined by Spregnel, a celebrated German chemist, who devoted much attention to Agricultural Science. The three soils are under the numbers 1, 2, 3—number 1 being a very fertile alluvial soil from East Friesland, formerly overflowed by the sea, but under cultivation for 60 years without manure; number 2 being a fertile soil, producing excellent crops of clover, pulse, rape, potatoes, and turnips, "the two last more especially when manured with gypsum"; and number 3 being a very barren soil from Luneberg:

	No. 1.	No. 2.	No. 3.
Soluble saline matter,	18	1	1
Fine clay and organic matter,	937	839	599
Silicious sand,	45	160	400
	1000	1000	1000

These numbers present very striking differences. No. 1 contains a large quantity of saline matter, consisting of common salt, chloride of potassium, sulphate of potash, sulphate of lime, sulphate of magnesia, sulphate of iron, and phosphate of soda, while No. 3 contains a large proportion of sand, but is deficient in other substances which confer fertility, as shown in the subjoined table, in which the finer portions, separated from the sand and soluble matter, consisted, in 1000 parts of—

	No. 1.	No. 2.	No. 3.
Organic matter,	97	50	40
Silica,	648	833	778
Alumina,	57	51	91
Lime,	59	18	4
Magnesia,	8½	8	1
Oxide of iron,	61	30	81
Oxide of magnesia,	1	3	½
Potash,	2	trace	trace
Soda,	4	do	do
Ammonia,	trace	do	do
Chlorine,	2	do	do
Sulphuric acid,	2	¾	do
Phosphoric acid,	4½	1¾	do
Carbonic acid,	40	4½	do
Loss,	14	—	4½
	1000	1000	1000

In reviewing this table, it appears that No. 1 contains all the elements of fertility, having 10 per cent of organic matter, nearly 6 per cent of lime, a large quantity of saline matter, with the acids, soda, and potash, in sufficient quantities. The soil No. 2 shows a deficiency of soluble saline matter, and also of lime and organic ingredients; but, on the whole, it contains (some in limited quantities) all the elements of fertility, and under proper management, may be made highly productive. The figures under No. 3, show a great deficiency of organic matter, and lime, but an excess of the oxide of iron. The effect of this excess of iron must be neutralized, and the substances found wanting supplied by the application of manure in proper proportions; otherwise this already miserable soil should be given up to hopeless sterility. It is of the greatest importance to know the constitution of the soil, as well as of the plants intended to grow upon it, as then, if the soil should be found deficient in the particular food required by the plant, it could be supplied from the farm yard, or some other source. In like manner, when we know the ingredients in the composition of a plant, we can make a proper selection to feed animals, either for fattening or for the pail. Impressed with the importance of this knowledge, I copy the following table, drawn up by Sir Robert Kane, from accurate analysis, by Baussingault.

100 parts of the following substances, considered as dry, consists of—

	Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Ashes.
Wheat,	46.1	5.8	43.4	2.3	2.4
Wheat straw,	48.4	5.3	38.9	0.4	7.5
Oats,	50.7	6.4	36.7	2.2	4.0
Oat straw,	50.1	5.4	39.0	0.4	5.1
Potatoes,	44.0	5.8	44.7	1.5	4.0
Turnips,	42.9	5.5	42.3	1.7	7.6
Red clover hay,	47.4	5.0	37.8	2.1	7

100 parts of these, in their ordinary state of moisture, contain usually—

	Clover hay.	Turnips.	Potatoes.	Wheat	Do. straw.	Oats.	Oat straw.
Dry material,	79	7.5	24.1	85.5	74	79.2	71.3
Water,	21	92.5	75.9	14.5	26	20.8	28.7

100 parts of the ashes of these substances contain—

	Wheat	Wheat straw.	Oats	Oat straw.	Potatoes.	Turnips.	Clover.
Phosphoric acid,	47.0	3.1	14.9	3.0	11.3	6.1	6.3
Sulphuric acid,	1.0	1.0	1.0	4.1	7.1	10.9	2.5
Carbonic acid,	1.0	1.0	1.7	3.2	13.4	14.0	25.0
Chlorine,	trace	0.6	0.5	4.7	2.7	2.9	2.6
Lime,	2.9	8-5	3.7	8.3	1.8	10.9	24.6
Magnesia,	15.9	5.0	7.7	2.8	5.4	4.3	6.3
Potash,	29.5	9.2	12.9	24.5	51.5	33.7	26.6
Soda,	trace	0.3	0.0	4.4	trace	4.1	0.5
Silica,	1.3	67.6	53.3	40.0	5.6	6.4	5.3
Alumina,	1.3	1.0	1.3	2.1	0.5	1.2	0.3
Moisture & loss,	2.4	3.7	3.0	2.9	0.7	5.5	0.0

By means of these investigations of Baussingault, I could actually ascertain the exact quantity of these various elements taken from the soil, by the growing crop; but having already exceeded the limits which I first proposed, I can only refer such as might be anxious to pursue this subject farther to works written expressly on agriculture. These results show how numerous are the substances which the plants abstract from the soil, and if the process of abstraction be continued, it would ultimately be left barren, and unable to sustain a growing crop in a healthy state. Therefore the land must be renewed, either by manuring or by allowing it to repose.

Wishing to limit myself on this subject, I shall only briefly state the most approved plan resorted to by the best agriculturalists.

The admixture of clay with sand or peat produces both a physical and chemical alteration, favorable to cultivation; so

does lime, mixed with other substances, form an excellent compost, which, when applied to soils containing little or none of this fertilizer, never fails of having a good effect. Land may be increased in permanent value by planting it. All woods however, are not equally effective in improving the soil.—Scotch fir effects very little improvement; beech and spruce effect still less; but under ash, oak, larch, and other tribes whose leaves contain enriching matter, the soil is increased in value. Land laid down to artificial grasses for some years is restored to a sound condition. Running water being always charged with both organic and inorganic food for plants in a greater or less degree, should not be allowed to escape without discharging a very important duty—that of enriching the soil wherever the circumstances of the surface would admit it. Pure water is known to improve the soil considerably, but the benefit bestowed will be increased in proportion to the quantity of manuring ingredients conveyed to the surface. It is upon this principle that lime or shell marl is sometimes diluted in the water of the upper carrier, in order that its particles may be conveyed to the different parts of the ground. Salt is excellent upon rushy and sour pastures, which are subject to occasion rot in sheep; such is its effects, that it prevents that destructive evil from attacking them. The salt, as well as the lime, or marl, should be put in small quantities into the upper cut, and stirred about occasionally, in order that it may be borne down by the stream, and equally diffused among the roots of the grass, which will soon prove the beneficial effects of such a mixture. When the velocity of the water in the cut is imperceptible, it is useless to impregnate it with salt or rich earth, as the particles will soon fall to the bottom, gravity exerting a greater force than the propelling force of the water. I have observed that the fertilizing effects of

water, whether pure or charged with manuring ingredients, is very great. Therefore, the practice of irrigating land should never be neglected. What has tended to fertilize the arrid land of the Egyptians but the periodical overflowing of the turbid waters of the Nile. So duly is the benefit derived from the watering of the land appreciated by some scientific farmers, that the practice is never omitted at the proper season, while others seem to be indifferent to so cheap a source of improvement. I have had considerable experience in this department of improvement in the old country, and I can assert that, in every case where it was tried, the result was beneficial. The water should never be allowed on land before it is thoroughly drained, nor on any place from which it could not be drawn off at pleasure.

The sinuosities of the surface of Wisconsin are favorable to irrigation, and where water and a sloping surface present themselves, advantage should be taken of the concurrent circumstance. In many parts of Europe, as well as in the United States, the land is sown with green crops, which are ploughed into the soil to enrich it. Straw, hay, saw-dust, bran, brewers' grain, malt dust, rape dust, charcoal powder, sea weed, marl, sea sand, gypsum, tanners' bark, soot, coal dust, and coal tar, are used in various ways as fertilizers. Peat is extensively used as a manure in countries which abound in bogs. Peat charcoal is also used, and where turf is the only fuel used for domestic purposes, the ashes are of some importance as a manure. The ashes of pure turf are similar to those of other plants, except that the soluble ingredients, for the most part, are absent. For instance, the quantity of potash present in most ashes of plants, is not found in turf ashes. From an analysis carefully conducted on the continent of Europe, turf ashes differ in their constitution; some containing magne-

sia, potash, soda, sulphuric acid, &c., which are highly beneficial; while the ashes of a different description of turf, on account of the absence of some of these substances, are of little value.

Every farmer is aware of the action of animal manures, which are much more stimulating than vegetable manures. The refuse of fish, skins, tallow, and of other animal substances, are employed with much advantage to renovate the soil. Wool, hair, woolen rags, and all similar substances exercise a higher and more lasting influence on the soil than any description of vegetable matter. Blood, mixed with other ingredients, makes a good compost. Shell fish, bones, and hoof parings are used as manures with good effect.

The relative value of vegetable manures is estimated, first: by the relative quantity of inorganic matter they contain; and second, by the relative quantity of nitrogen present in each. Digested animal substances, such as night soil, the solid excrement of horses, cows, sheep, hogs, and birds, are known to exercise great influence on vegetation. The urine of men, horses, cows, and other animals, is in high esteem among agriculturalists. Trifling as the quantity of urine voided by animals may be considered, its waste amounts to a national loss, which, in amount, is incredible. Mr. Smith, of Deanstown, one of the first authorities in England upon such matters, says that the urine of two men is sufficient to manure an acre of land; and, if mixed with ashes, will produce a good crop of turnips. The quantity of phosphates in human urine gives it a higher value, as compared with the urine of other animals, in which these substances are absent. Liquid manure should never be allowed to go to waste. If not collected in tanks, as in many parts of Britain, it should be made to flow over the surface of some field, which it could not fail to improve.

The large quantity of ammonia in guano, gives it fertilizing powers which are generally known and acknowledged. This substance contains also a proportion of phosphates, which enhance its value. Valuable as many of these substances are, as manures, some are so expensive, and more so scarce, that their use must always be confined to individuals, and to particular localities. They may all, however, be supplied by the use of the farm yard manure, which is within the reach of every farmer, and which contains all the elements of fertility—a quality not possessed by any particular manuring substance mentioned in this chapter. Its quantity and quality depend on the rigid economy used in collecting it, and upon the manner in which it is made, kept, and used on the farm. The following is the result of analysis of farm yard manure in a half rotted condition, by Bausingault. The result, of course, depends on circumstances, which are continully changing, and therefore no two will exactly agree. The manure, in its usual form, contains 20.7 per cent. of dry material, and 79.3 of water :

	Richest.	Poorest.	Average.
Carbon,	40.0	32.4	35.8
Hydrogen,	4.3	3.8	4.2
Nitrogen,	2.4	1.7	2.0
Oxygen,	27.6	25.8	25.8
Salts and earth,	25.7	32.2	32.2
	100.0	100.0	100.0

The ashes of 100 parts of this manure contains—

Carbonic acid,	2.0
Phosphoric acid,	3.0
Sulphuric acid,	1.9
Chlorine,	0.6

Silica, sand and clay,	66.4
Lime,	8.6
Magnesia,	3.6
Oxide of iron and alumina,	6.1
Potash and soda,	7.8

By inspecting this analysis, it will be seen that it contains all the constituents of plants in general, and therefore all the wants of the farm can be supplied from the dung heap, at an expense, too, which no industrious farmer could feel. As nothing in nature is completely annihilated, by any change that can take place, either mechanical or chemical in its constitution, it appears that if every crop grown on the farm be consumed on it, its condition of fertility can, by no means, be deteriorated. On the contrary, every load of straw, hay, or of any other vegetable matter which had grown on the farm, and sold in the market, or otherwise disposed of, will lessen its productive power by just the amount thus sold or removed; consequently as much of the produce of the farm as may be consistent with the circumstances of the farmer, ought to be consumed on the land, or returned to it in the shape of manure. Hence the practice of feeding sheep and other descriptions of stock on the farm, is resorted to by the best farmers in order to improve and renovate it. The animals fattened on the farm, if sold, will diminish its fertility by the amount of what they weigh; but if consumed on the premises, the land can sustain no injury.

Having glanced over numerous topics connected with that branch of the industrial resources of Wisconsin, which I consider must form the principal occupation of the people for a long time to come, I shall further suggest such improvements in the general management of the farm as appear to me to be best calculated to advance the general interest of the State.

In a new country, such as Wisconsin, it is well known that the wild grasses peculiar to it, are far from containing the same quantity of nourishing juices as tame or artificial grasses; nor does it produce the same quantity in the wild state; therefore, every farmer should take especial care to lay down his fields with such artificial grasses as he may know from experience would best succeed. I find that clover and timothy grow well in every part of the State; consequently the cultivation of these two grasses should not be neglected. Where industrial intelligence has advanced agriculture to a high degree of perfection, as in England, Belgium, and other European countries, the natural grasses are replaced by the more nutritious articles—turnips, parsnips, carrots, &c.—on which cattle are fed in comfortable sheds, instead of being allowed to roam about, wasting their food in muscular efforts inconsistent with their ultimate use. This, however, cannot be successfully carried out with advantage in our present condition. One thing, however, ought to be done: cattle ought to be fed and confined at night, during the inclement season of winter and spring, in suitable sheds, instead of going about in quest of food and shelter, as I have seen them in the severest weather. Cows, as well as horses, require to be fed well, and kept warm and clean during the night, in cold weather, otherwise they cannot thrive.

Farmers would be well paid by rearing more stock than they do at present. Every year will give increased facilities of bringing cattle to market. The construction of the Rail Road from Boston into Maine has induced the farmers in the central parts of that State to send to Cambridge, Mass., in 1850, no less than 14,000 cattle, which sold for good prices. We shall soon have similar facilities in our State, and the farmers having an abundance of cheap food for cattle, will no doubt

take advantage of them. A good milch cow will sell for $20; good beef cattle for $30, and a yoke of oxen for $75. Dairy cows, properly taken care of, would yield, each, on an average, 150 lbs. of butter in a year, which would readily sell, in summer, for 16 cents a pound, and in winter for 25 cents; making, in the year, $30.75, which is a handsome profit, considering the little trouble or expense in feeding a cow, and manufacturing the butter. Besides the sum realized by the sale of the butter, the calf would fetch $5, and the sour milk would be valuable for feeding hogs and calves. By moderate care, a cow would produce 210 lbs., but, wishing to give no exaggerated statement, I make the amount as low as 150 lbs., which is under the average produce. Cheese might be made with good profit; a cow would produce of this article from 150 to 200 lbs., which would fetch 8 cents per pound, which, by the cheese alone, would make $16 a year.

Col. T. Bridgeman, in his report to the Commissioner of Patents, says that 100 lbs. of corn will produce from 10 to 12 lbs. of beef, and an acre will, on an average, produce 50 bushels of corn, (2800 lbs.,) therefore, 336 lbs. of beef may be produced from an acre, which, at 6 cents, would amount to $20.16.. Hay pays well in most parts of the State. An acre produces, at the price it has sold for in the market, from $15 to $16, and, in some places, more. Hogs are a source of great profit in most parts of the Western States, especially in Ohio and Kentucky. Wisconsin is beginning to see the advantage of attending more to this branch of farming industry. By keeping sows to breed, young hogs cost but little. Oats and corn are grown at a small expense, and both are first rate food to fatten hogs. Corn, however, is generally the food employed for this purpose. Mr. J. E. Dodge, of Grant County, writing to one of the Commissioners of Patents, says,

"I selected two pigs, the heaviest was fed with corn meal mixed with cold water, the other with shelled corn with plenty of pure water to drink. We have then the true gain in pork weight produced, which was 6¾ lbs. for every 56 lbs. of meal, and 5 lbs. for every 56 lbs. of corn. This appears to be very small indeed from such a large expenditure of food, yet even at that rate an acre would yield a good profit, by feeding hogs on its produce. Pork sells at present for about $4.50 per hundred.

Horses bring a good price in this State. A pretty good horse brings $100 or $120. One or two brood mares would soon increase the farmer's stock. Mr. George Boyer, of Pennsylvania, a good authority on such matters, says that 30 years' experience in the business has proved "that there is no difference in the expense of rearing a colt and steer till three years old. At the age named, a colt will sell for $75 or $80, and a steer for less than one-third of that." Sheep may be reared almost to any amount in Wisconsin, which I consider well adapted to that department of husbandry. In an able article on sheep husbandry and wool-growing in the United States, by Henry Randale, of the State of New York, it is clearly proved that the United States possesses half the cheap fertile land included in the wool-zone throughout the world, "nearly her entire territory lies within it. Experience proves that sheep are healthy in every portion of the United States. The terrible droughts and predisposition to certain diseases encountered by the Australian flock—the comparative insecurity of property in Buenos Ayres—the climatic vicissitudes of Southern Russia—are none of them known in our most favored wool region. Land is cheaper here and more fertile, and much nearer the great wool markets of the world than Australia." With all these advantages in our fa-

vor, we ought to compete successfully with South America and Southern Russia in external markets—to undersell Australia in these markets, and to keep them, at all events, out of our own markets. In order to show the demand for home consumption, and also to prove that we can scarcely ever supply it, I subjoin the following tables, which will exhibit the manufactured and raw material imported for a few years:

Value of Woolens imported from 1821 *to* 1845.

1821,	$7,437,737	1831,	$12,627,229	1841,	$11,001,939
1822,	12,185,904	1832,	9,992,424	1842,	8,375,725
1823,	8,268,038	1833,	13,262,509	1843,	2,475,154
1824,	8,386,597	1834,	11,879,328	1844,	9,475,762
1825,	11,392,264	1835,	17,834,424	1845,	10,666,176
1826,	8,421,974	1836,	21,680,008		
1827,	8,742,701	1837,	8,500,292		
1828,	8,679,505	1838,	11,512,920		
1829,	6,881,489	1839,	18,575,945		
1830,	5,776,396	1840,	9,971,184		

Value of Wool imported from 1837 *to* 1847.

	Not exceeding 7 cents per lb.	Exceeding 7 cents per lb.	
Average imports of 1837, 1838 and 1839,	$558,458		
Average imports of 1840, 1841 and 1842,	759,646	$801,087	$1,359,545
Imports of 1843,	190,352	1,004,312	1,763,958
Imports of 1844,	754,441	54,695	245,047
Imports of 1845,	1,553,789	97,019	851,640
Imports of 1846,	1,167,305	136,005	1,689,784

The table of imports here exhibited shows how far our manufacturers fall short of supplying our home demand in the United States. At present (1851) many of the small manufacturers are stopping for the want of wool. "In as favored

a wool-growing country as the sun shines on, and where, on the home consumption is a discriminating duty of 30 per cent. *ad valorem*, we suffer not only foreign cloths and wool to come into the market, but we actually suffer our manufactories to languish for raw material." The following statement by Samuel Lawrence, Esq., the leading manufacturer of the United States, proves the necessity of increased attention to the rearing of sheep, so as to meet the demand of home consumption: "The manufacturer of woolen goods is now so far advanced in this country, that it will go forward as rapidly as the production of wool will allow." To show how we are circumstanced as to raw material: Allowing that each of the population consumes 4 lbs. of wool in a year, which is a low average, the consumption of Wisconsin would require a supply of 1,222,264 pounds, and, should our population increase as rapidly as it has within a few years back, it is not too much to expect that in ten years our consumption will amount to 3,222,332 pounds. When a farmer can do his own work, wool-growing is not, perhaps, the most profitable; but when he is obliged to hire help, it pays well, as one man can attend to a large flock.

Turnips are not grown in this State, except on a very limited scale for the table. Carrots, parsnips and beets are grown only for the same purpose. Sugar beet has been grown in some of the States to some profit, and I have seen beets, grown in this State, of enormous size. When they are used in feeding hogs, they are considered better than grain, and the cost one-third. When consumed by cattle, the roots are to be washed and sliced. Poultry leave considerable profit. A hen will leave a profit of $3 or $4 a year. Eggs bring a large price, in winter, in all western towns. They are preserved during the hot weather, and sold, when in demand, for

20 or 24 cents a dozen. There are a thousand different ways in which a farmer may provide for his table, and make a little money besides, provided he and his family are industrious. In addition to barndoor fowl, he may feed turkeys, and rear plenty of geese and ducks, which scarcely cost anything for feeding. Besides the flesh of geese and ducks, their feathers fetch a good price.

For some years back, the potatoe has not been cultivated in Wisconsin to any extent, owing, I suppose, to the attack of that destructive disease which threatens to banish it frem the field altogether. The elements of nature seem to wage war against this tubor in every part of the world where it has been cultivated. Numerous theories have been proposed in this country and in Europe to check the progress of this disease and prevent a recurrence of it, but all to no purpose. The malady still continues to baffle the skill of the most experienced scientific men of the age. The cause that has produced this blight, and the remedy to cure it are yet unknown. The crop was bad, both in quantity and quality, in every part of the Union I travelled, for some years, but the growth of the present year (1852) is very tolerable. The quantity of land occupied by this crop in this country is rather limited. Its failure in America is not of such serious consequence as in parts of Europe ; as Indian corn supplies its place in almost every respect, being the chief food of "every animal, from man down to the mauraudìng rat, while its dried blade furnishes us with 7-10 of the long food for our working animals." The indian corn crop is considered the "king of all crops" in almost every State of the Union. Its value, as an article of human food, is considerably reduced in crossing the ocean. It deteriorates in its passage so much that in Ireland, during the famine, the inmates of the poor-houses used it

with reluctance. I invariably witnessed the poor of that country, though in a state of starvation at the time, to express their dislike to Indian corn in any shape.

Cranberries are not only used in almost every family, but are also an article of commerce, being exported in large quantities to California, England, and other countries. $50,-000 worth were sent, in 1852, from Massachusetts alone to the land of gold. Our swamps and marshes would yield a very large return, by planting them with this article of luxury. I have seen it stated that a single acre, under proper management, will yield a profit of $500. If this be so, attention should be directed to the cultivation of this crop, especially in marshy and boggy lands unsuited to other purposes. From the experiments of eastern farmers, cranberries may be raised on almost any soil, but best on low meadow, which is found to be improved by drainage. They may be propagated by roots or seeds. The climate of Wisconsin is well adapted to the growth and perfection of this favorite fruit.

Numerous crops of great practical value, when considered in every available point of view, exercise little exhausting action upon the soil, which is a property in economic agriculture of no inconsiderable importance; as a saving in the exhausting action of a crop forms one of the chief elements of profit, when we consider that the great object of rotation of crops, and other scientific appliances is to raise from the soil the greatest quantity of produce at the least expense, and with the least injury to the soil. I have stated in some one of the preceding pages, that after the first stage of the growth of plants. the assimilation of their carbon is carried on by the decomposition of the atmosphere, by which the mere woody portion of the stem is almost exclusively formed from air and water, as the ligneous fibre is composed of carbon united

to oxygen and hydrogen, just in the proportion which farms water. A knowledge of this fact leads to very important results in agricultural industry. All the varieties of starch and sugar are composed of similar elements, carbon and water; that is carbon, oxygen and hydrogen. When these bodies are pure, they contain no nitrogen. The plants that contain starch and sugar require nitrogen and mineral elements, therefore they exhaust the soil. Now, if we extract from beet its sugar, and from a potato its starch, and return the remainder to the soil, it is evident that we restore all the parts of the plant that were exhausting, from which it appears that the land can produce a succession of crops of sugar and starch without any sensible diminution of fertility. I have thus shown the elementary constitution of beets and potatoes, without, however, representing them numerically, in order to direct attention to these articles of farming produce for manufacturing purposes.

In France and other parts of the Continent of Europe are manufactured large quantities of sugar, from the red and yellow beet,t he sugar obtained amounts to 7 or 10 per cent of the weight. We have so much sugar maple in this state, from which the article is obtained, barely at the expense of the labor bestowed on it, that to extract sugar from beet would not, perhaps, pay for the expense of raising the crop and manufacturing it. We are however differently circumstanced as regards the manufacture of starch from potatoes, which are known to produce more of that article from a given area than any starch-bearing crop. We import into this state a vast quantity of this article from New York, which might be supplied at home at near half the cost. An intelligent German, Mr. Hayer, has commenced this business within a short distance of town, and I hope he will receive encouragement.

He manufactures from wheat flour. On the Continent of Europe, the starch produced from the potatoe is consumed in making jellies, sago, tapioca, in thickening paper, in making confectionary, and in a variety of uses; the most remarkable being its preparation for sugar and spirits. The preparation of sugar from the potatoe is a branch of industry in almost universal practice, especially in Hamburg, from which place London receives immense quantities colored with burnt sugar, which makes it pass as French brandy. The sugar maple tree flourishes in almost all the parts of north America, its height is of ten100 feet,and its chief excellence consists in yielding sap for the manufacture of sugar, which is conducted during spring months. An orchard of maple trees is almost as good as a field of sugar cane of the same extent. This tree lives to the age of 200 years, and makes excellent fuel; in 1850, thirty four millions of pounds of sugar were manufactured in the United States. Of the twenty-seven states in which maple sugar is manufactured, Maine produced 1,392,427 lbs. Vermont 5,159,641 lbs. New York 10,310,740 lbs. Pennsylvania 2,218,-641 lbs. Virginia 1,223,908 lbs. Ohio 4,528,548 lbs. Michigan 2,428,997lbs. Indiana 2,921,638lbs. in addition to this the Indians east of the Mississippi river make annually 10,000,000 lbs., and those west 2,000,000 lbs., besides this quantity of sugar, the sugar maple yielded in 1850, forty millions of gallons of molasses.

I have had the means of ascertaining the quantity of sugar manufactured in Wisconsin that year which was 661,269lbs.

I have seen very little manglewurtzel grown in this state, peas and beans are grown in limitted quantities for home consumption; rye is receiving more attention of late than it formerly did, buck wheat is cultivated in small patches and is very generally used in the winter season, it is made into thin

pancakes and used hot, with butter or molasses, if allowed to cool, it loses all its attractive qualities; I consider it as good when well cooked as the best pancake made in the old country; wild rice grows in parts of this state.

Mr. Bonsan, writing from the falls of St. Croix, says, "the Indians gather large quantities of it, their method of doing which is, they pass through amongst it with their canoes before it gets quite ripe and collect the heads together in handfulls and give them a twist so that they will stay together; this prevents them falling down into the water. When quite ripe, they again pass along in their canoes and bend these clusters of heads over into them, and with a small stick beat out the grain.

In this manner two of them will collect three or four bushels in a day. Their method of using it is either to parch it over a slow fire, and then mix it with a little sugar, and in that manner eat it; or to boil it and mix it with a little grease, if they have any, or if not, to eat it without anything to make it relish. White men frequently lived on it in that manner for several days, and found it very nourishing. We use it a great deal at table and find it much more nutritious than Southern rice. The Indians frequently sow it when they find a place fit for it, if it is not already growing spontaneously." In the north-west parts of the State, there are numerous lakes whose margins would be favorable to the growth of this species of rice.

Onions are a very profitable crop in this State, which seems to be well suited to their growth and perfection. I have seen onions of immense size grown in many parts of the State, and as they are in good demand, more attention should be paid to their cultivation. Cabbages and all its tribes pay well in all large towns throughout the State. It is not, how-

ever, a vegetable much used at table, except among the Germans, who consume large quantities of it in a fermented state, called *sour krout*. Melons, squash, tomatoes, &c., grow well in the open fields. Rhubarb thrives well here also.

Flax is a crop to which I am desirous to direct particular attention, on the variety of uses to which it may be applied, the profit it brings to the farmer and manufacturer, and the extensive field it opens up for industrial labor. It may be cultivated on lands of moderate fertility, but the produce will be more abundant on soils distinguished for richness of quality, openness of texture, and absence of noxious weeds. It has been always considered a very exhausting crop, for which reason the soil requires to be highly manured.

In Belgium, where flax is grown extensively, the ground is effectually manured by copius applications in the liquid form. The presence of lime, in a caustic state, is unfavorable to the plant; therefore, land recently limed, should never be selected for its growth. Light clay loams are considered as well adapted to the flax plant. The great difficulty that presents itself in the cultivation of flax upon a large scale is the labor of steeping and dressing it fit for the market; but I hope this difficulty will be obviated by the application of a recent discovery which is gaining ground every day. Having stated before that the flax plant is very exhausting to the soil, it may be well to have it understood that, by proper management, it exercises no exhausting action whatever on the soil, as all the crop that is of any money value to the farmer mer is derived from elements of the atmosphere, and the substances derived from the soil and manure are only employed by the plant in organizing those materials which are absolutely valueless, and therefore generally thrown away.

The steep-water and chaff of the scutched flax contain

all the materials taken from the soil and manure; therefore, when after they are decomposed and returned to the soil, its fertility is restored. A knowledge of this fact has given rise to an economical system very generally practised by industrious farmers, of securing all the steep-water, and spread-it on the surface of the land from which the crop had been extracted, instead of allowing it to run to waste, and poison our rivers and infect the air. From a due sense of the importance of this agricultural branch of industry, the flax improvement society of Ireland have devoted, of late years, more than ordinary attention to the subject of growing and preparing flax on such improved principles, as to realize to the farmers who might embark in that department of husbandry a maximum profit, and the result of increased exertion, on the part of that useful and benevolent society, fully proves what can be done under more favorable circumstances in our State, which is, in every respect, well adapted to the growth of that fibrous article. Previous to the year 1846 the labors of that society were confined to the north of Ireland, a part of the country long celebrated for its superior linen fabrics. But anxious to extend the sphere of its usefulness to the southern and western provinces. then (1847,) suffering under a visitation, which has no parallel in any age or nation of the world, the improvement society obtained a grant of £2000 from the government, and at present twenty-two counties are in connection with it. Under the fostering care of that society, the quantity of land under flax cultivation has increased from 23,866 acres in 1848, to 91,000 in 1850, and to 138,619 in 1851. The fearful condition of the country and the beneficial results of the previous grants, induced the government to assist the society with a sum of £1000 for three successive years,

it was enabled to send out practical instructors through the country to superintend the planting, pulling, steeping, and dressing of flax, which, from the ignorance of the farmers in the management of that crop, was indispensable.

The steeping of flax on the old system, requiring several days, and sometimes weeks, the improvement society enlisted the services of Mr. Schenck, of New York, who proposed to accomplish this process in 60 hours, by means of water kept at a high temperature, and the manner in which he discharged his duty gained the unqualified approbation of those who engaged him. To carry out his plan, Mr. Schenck recommended retterics to be erected at various points for the convenience of the flax-growing districts, and now that gentleman's plan is in full operation in many parts of the kingdom. In 1851, 36,388 tons of fibre were produced from 138,619 acres of land, which at £45 per ton, would amount to £1,-637,460, to which may be added the value of the seed saved, amounting to £60,000, all making a total value of £1,700, 000, realized in one year, from the produce of 138,619 acres, being £12,5 per acre, or about 61 dollars. Should any of the numerous plans, now under trial, to convert the raw material, or rather the flax straw into a fabric fit for the spindle, on some more expeditious principle than is practiced at present, the cultivation of flax would be considerably extended, and the profits proportionably increased in Ireland. M'Claussm proposes to convert flax fibre into a material resembling cotton, and capable of being spun on cotton, flax, woolen, or silk machinery; but having no better authority to recommend the plan than the confident reports put forward by the public press, I can only say that if he accomplishes what he proposes, a new field will be opened for the application of in-trial labor, which will extend employment and yield re-

munerative profits to such as may embark in that particular branch of husbandry.

There is one practice of long standing which ought to be abandoned in Ireland as well as elsewhere. Year after year the annual reports of the flax society have contained earnest recommendations, that the seed of the flax crop, instead of being rotted with the stems in the pools, should be taken off by rippling, to be employed for sewing, sold to the oil mills, or used by farmers as food for live stock. These, after repeated recommendations have had the desired effect, at least to a certain degree; as about 8,000 bushels of rippled seed have been purchased at the Belfast oil mill, from a few districts in the neighborhood of that town. A general neglect of this practice in Ireland during the last year, with the above exception, has led to an actual loss on the quantity planted of £300,000, which, in a country like that, may be considered a deplorable neglect. The large quantities of linen fabrics from Ireland, imported into the United States must force upon us the necessity of growing flax sufficient for home use, at least. With a soil fit for the cultivation of flax, and free from yearly rents and taxes, except what are necessary for the exigencies of the State, we ought not only to be able to keep Irish fabrics out of the market, but to undersell them in their own, as well as in all the English and Scotch markets. Want of cheap labor, and knowledge to convert flax to its ultimate uses, will prevent successful competition for many years to come.

Besides the profit yielded to the farmer from a flax crop, there is no branch of human occupation that gives employment to a greater number of individuals, and few departments of industry leave more profit, in all the channels through

passes. It is estimated, that to manufacture 100 stones of flax requires 158 females for twelve months, in spinning; 18 weavers for twelve months, in weaving; and 40 women for needle-work, besides the number employed in pulling, steeping, scutching, bleaching, &c. A gentleman who had great experience in the business of flax-growing in Holland and Ireland, has commenced the growing of that article in Waukesha County, on a large scale, and his practical knowledge of that crop, in all its stages, will yield him a good income, if his capital and other resources are adequate. Mr. Galbraith will not only benefit himself, by realizing large profits, but will be the means of spreading a knowledge of the proper management of flax throughout the State, which cannot fail of proving highly useful.

The next subject to which I would wish to call attention, is the cultivation of hemp, which is almost perfectly analogous to flax. It is by no means of such importance, as its use is limited to very few purposes. Having stated a few facts relating to the money value of flax, as an agricultural crop, and to the vast amount of labor it affords, from the time the seed is committed to the ground till the fibre is actually made into garments, I shall next give the analysis of the different parts of the plant to bear me out in the assertion that by economizing the residual parts, which are generally converted to no useful purpose, the soil suffers no injury. A difficulty presents itself to the enlargement of operations in both the flax and hemp crops, which cannot be well obviated by individuals; but under the advice and patronage of an Agricultural Society, every difficulty may be removed, and the business of flax and hemp-growing rendered one of the most productive operations the farmer could embark in. In order to understand the general bearing of the argument, that by proper management the

flax crop is not an exhausting one, I subjoin a table expressing numerically the composition of the ligneous fibre which is composed of the same elements as starch and sugar:

Carbon,	50.00
Hydrogen,	5.55
Oxygen,	44.45
	100.00

Hence this fibre, which is the part spun, comes entirely from the atmosphere.

Flax plant.

Carbon,	38.72
Hydrogen,	7.33
Nitrogen,	0.56
Oxygen,	48.39
Ashes,	5.00
	100.00

Composition of the ash of the stem of the flax plant.

Potash,	18.41	7.697	22.859	22.30	9.78
Soda,	10.91	19.186		14.12	9.82
Chloride of sodium,	5.65	8.213	8.701	4.59	2.41
Lime,	18.37	15.279	16.483	18.34	12.33
Magnesia,	3.02	5.446	3.332	3.93	7.79
Oxide of iron,	2.36	4.301	1.523	1.10	0.00
Alumina,	1.44	0.444	0.438	0.72	6.08
Oxide of magnesia,	trace	trace	trace	trace	trace
Sulphuric acid,	9.68	6.280	6.714	6.83	2.69
Phosphoric acid,	11.06	11.206	11.802	8.81	10.84
Carbonic acid,	13.75	20.599	25.235	16.38	16.75
Silica,	5.33	3.056	3.408	2.08	21.35

Tobacco and hops are grown in this State in small quanti-

ties. Both would pay, especially hops. It is said that for some years the tobacco crop is falling off in the States celebrated for its growth, occasioned, it is supposed, by the exhaustion of the soil devoted to that crop. It is much to be regretted that so much land as is devoted to this article should be wasted on a weed which is not only useless, but absolutely injurious.

The following facts are interesting, as indicating the rapid progress this State has made during the few years that have passed since the first white man took possession of it. There are at present 1,011,308 acres of land improved in Wisconsin, with farming implements and machinery worth $1,701,047; live stock worth $4,594,717; 4,292,208 bushels of wheat; 1,983,378 bushels of Indian corn; 768 pounds of tobacco; 243,065 lbs. of wool in 1850, and 353,000 lbs. in 1851. There were manufactured in the year 1850, 68 gallons of wine, 888,816 lbs. of butter; 440,961 lbs. of cheese; 295,926 tons of hay; 661,969 lbs. of maple sugar; 100 tons of hemp were water rotted, and 834 bushels of flax seed saved. Our home-made manufacture amounted to $57,506. The importance of flax made into a material resembling cotton, is at once seen from the immense consumption of the latter in different parts of the world. In Wisconsin, where the wheat crop is so uncertain, the cultivation of a fabric of such general use is the more important. In 1851, Great Britain consumed 648 millions of pounds; Russia, Germany, Holland and Belgium, 118 millions; France (including adjacent countries,) 149 millions; Spain and the Meditterranean towns, 46 millions; the countries bordering on the Adriatic, 45 millions; United States of North Ameriea, 158 millions; sundry other places, 11 millions; making in all 1175 millions of pounds.

It may be of some value to persons coming to the west to

know that plenty of wild hay can be obtained in many parts of the State, to support their stock till they make artificial meadows. To the beaver they are indebted for many of the meadows thus prepared for them, several being the result of dams thrown up by these thoughtful and provident animals. These dams are visible in many parts of the State.

CHAPTER VI.

Having endeavored to establish the condition under which we found in this State two elements (fire and water) essential to the prosecution of a most important branch of Manufacturing Industry,. I shall now proceed to prove that we stand in a position, as regards this branch of business, unequalled by any State of the Union. Hitherto we have confined our operations to the raising of minerals, in which this State is rich beyond comparison, and, possessing charcoal and water power almost without limit, the manufacture of these ores, with which the State abounds, must become a source of industrial wealth, calculated to raise Wisconsin to eminence among the States of the Union. In 1839, the lead region of Wisconsin produced 30 millions of pounds of lead, though worked under the disadvantage of insufficient capital and inadequate machinery; all Europe having produced that year no more than 131,700,000 pounds, of which Great Britain alone furnished about three-fourths.

The country surveyed by Dr. Owen, the well known Geologist, embraced an extent of 11,000 miles, which h- -----

sents, on the whole, to be one of the richest mineral regions yet known in the world, and capable of producing annually 150 millions of pounds, and giving employment to 10,000 miners. Besides this inexhaustible treasure in lead, there are supplies of copper, iron and zinc ores. Some idea of the purity of the copper ore of Wisconsin may be formed from the fact mentioned by Dr. Owen that it yields from one-fifteenth to one-third more than the celebrated mine of Cornwall, in England. Independently of the mineral wealth of Wisconsin, Dr. Owen says that he knows of no country in the world with similar mineral resources, which can lay claim to a soil as fertile and as well adapted to the essential purposes of Agriculture." The situation and extent of the country containing mineral treasures lies nearly in equal portions on both sides of the Mississippi, between latitude 41 and 43 degrees, commencing at the mouth of Rock River, and extending thence north, upwards of 100 miles, to the Wisconsin River. The Lead region lies chiefly in Wisconsin, including about 62 townships, or 2232 square miles.

In the outline of the Geology of this State, I mean to dwell a little on the formation of the mineral districts. In this place, it is only necessary to mention that the mineral bearing rock is what is termed by English Geologists scar limestone, and by Dr. Owen cliff limestone. From the large quantity of magnesia it contains, I would term it magnesian limestone, which, perhaps, would render the name more general, the other two names being local; scar limestone signifying steep, rocky; and cliff having been adopted from the external character of the district, which imparts to the scenery a bold and romantic character. But as this contains from 30 to 40 per cent. of magnesia, it is to all intents and purposes agnesian limestone.

It may not be out of place to mention here that from this rock may be manufactured any required quantity of of epsom salts, (sulphate of magnesia,) by the addition of sulphuric acid, which last might be manufactured at a cheap rate in Wisconsin. It is a coincidence worthy of remark, as having a direct bearing on the exploration of mines, that the scar limestone of England (Phillips), and the cliff limestone of Wisconsin, (Owen), contain more lead than all the other sills put together. When the cliff limestone is fractured it presents a light greyish yellow color, passing occasionally into a brownish, or reddish yellow, especially when exposed to the weather. When viewed through the microscope, it appears to be made up of minute, rhomboidal crystals, disseminated over its surface; but when seen with the naked eye, it appears sandy and granular. The fresh fracture exhibits a glistening lustre, and a sub-crystalline aspect. It is asserted by an experienced miner, regarding the metalliferous veins of Cornwall, that it is a rare circumstance, when a vein, which has been productive in one species of rock, continues rich long after it has entered into another, and this change is even remarked when the same rock becomes harder or softer, more slaty or more compact. The northern boundary of the Wisconsin lead region is nearly coincident with the southern boundary line of the blue limestone, where it fairly emerges to the surface. When this line is reached, no ore of importance has been discovered, which proves the correctness of the above assertion. "Hence it was very unlikely that the Wisconsin lead ore, so rich in the cliff limestone, should retain the same rich character in the blue limestone, even had the structure of this last been equally adapted to the bearing of lead."

The lead region of Wisconsin is almost exclusively confined to the south-west part of the cliff limestone formatio-

upper beds, lying in the southern portion of the district, do not furnish productive veins of ore. The crevices in the upper beds are less numerous, and either empty or filled with iron ore, or calcareous spar. The magnesian limestone that underlies the blue limestone and sandstone strata, and comes to the surface in the extreme northeastern portion of the district is similar to the cliff limestone in structure and composition, including its disposition to form vertical fissures, which might induce the expectation that it would be rich in lead ore. From all the reports that have been made of this lead-bearing region, all the valuable deposites that have been discovered were found imbedded in the recent deposites that overlie the cliff rock, or in the rents and fissures of that rock. These fishures vary from the thickness of a wafer to 30 or 50 feet, and many of them extend to an unknown depth. It is a curious fact that the fissures of productive lead ore run east and west, or a little south of east and north of west. The rich veins seldom quarter. A regular vein half an inch thich, imbedded in a rock requiring to be blasted, will pay well, and where the crevice is filled with clay or loose rock, a vein of a quarter of an inch thick will pay for working it. In the neighborhood of Minerel Point and Dodgeville, veins running north and south are found to be productive in lead ore, which shows that the force which produced these fishures is not restricted to any particular point. The downward inclination of these crevices does not seem to be uniform. The entire crevice is not generally filled by the ore, which is commonly surrounded by clay or sand.

Chrystaline carbonate of lime may be considered the veinstone or gauge of these lead mines. Lead is found in fissures from the size of apea to a cube of one thousand pounds weight. The clay in which the oar is found imbedced is sometimes of

a jet black color, owing to the presence of manganese. It is often found in feruginous clay, and in a fine sandy looking powder, formed from the decomposition of the rock. The lead ore is sometimes found in a solid sheet, compressed between the sills of the crevices, and in this position it is called sheet mineral; when found in detached masses, it is called chuck ore. It is rather curious, that though the ore is never found attached to the side walls of the crevices, it nevertheless is imbedded in the rock which caps it, and sometimes it reaches the surface through a contracted funnel. When a rock crumbles under decaying influenees, the ore is then found in detached masses among the clay or rubbish along the depressed surfare, which, in general, can be traced.

Mineral veins generally occur in the vicinity of trap dykes and other volcanic rocks. I am not aware of any part of the world showing surface indications of mineral deposites so palpably as the mineral region of Wisconsin. In Dr. Owens' able report, he says, "When the outlines of a hill present a sort of bench, or step, or slight undulation, even if but small, and not readily remarked, yet as indicating a slight slip from an internal rent, it becomes a symptom of lead, which the experienced miner's eye instantly detects." For the same reason, a small ravine along the side of a hill may be considered a reasonable indication of a mineral vein. I have stated that the mineral veins run east and west, north and south; therefore sink-holes running in these directions are indications of concealed treasure. Calcareous spar found on the surface is a good indication; but if found in large quantities, it is an unfavorable one. In Wisconsin, as well as in many other parts of the world, there may be rich mines without any surface indications whatever. Where the surface shows no ravines, high bluffs, or artificial cuttings, it is

in general difficult to tell what is buried under the soil. This difficulty is not experienced in Alpine regions, where every streamlet groves out a deep ravine, exposing to view all the treasures of countless ages, which, without the abrading action of the streamlet, would probably remain hidden under the surface till time was no more. The most trustworthy indication observable in the Wisconsin lead region is the appearance of mineral gravel in connection with the crumbling appearance of the adjacent magnesian limestone, to which may be added minute dark specks spread over the surface of the rock, forming delicate figures, resembling ferns. When the surface presents an arid aspect, it indicates the feruginous clay in which lead is often found embedded.

These mines are not worked with the same economy as those of the old country, where the operation requires steam power, at an enormous expense, to be employed day and night to unwater them. Here, the moment the mine becomes inundated, which is often the case, at a small depth, it is at once abandoned.

With the exception of a few localities, the ore worked is sulphuret of lead, called galena, from which almost all the lead of commerce is derived. One of the localities in which carbonate of lead is worked is near the Blue Mounds. In some places the sulphuret of lead is intermixed with the sulphuret of zinc, called black jack, and occasionally with oxide of iron and carbonate of zink. Dr. Owen, in his able report, gives the following statistics of the lead region, which I take leave to transcribe: "In proportion as I proceeded with the geological survey of the Wisconsin lead region, I became more and more strongly impressed with its great value and rich promise of commercial importance. This conviction urged me to the task of carefully collecting and collating such

facts as might supply materials for a comparison between the geological character of this region and that of the richest lead districts in Europe, the Cross Fell country of the north of England." That comparison has been briefly made, and as far as it goes, it is, in a pecuniary and commercial view, highly satisfactory. "The strong similarity between the two formations furnishes an encouraging item in the estimates of the value of the mineral tract now under examination. But other and more direct proof of that value yet remains. The statistics of this American lead region, so lately settled, so insufficiently worked for lack of force, even in those localities where a cursory survey had chanced upon rich lead veins—these statistics, uncertain though they be, of a country so new and rude, impel us to the conclusion that the Wisconsin lead region may compare, if not in present productiveness, at least in future prospects, with any in the known world.

For a time my opinion was very unsettled as to the actual amount of lead now annually produced in the district. The merchants of Galena, when the question was put to them, calculated the total in Wisconsin and Illinois, (when the nine-tenths of the lead is made,) at from ten to twelve millions of pounds; but I soon became convinced, even from a particular inquiry as to the amount actually produced at a very few furnaces, that this was far below the truth. I found, for instance, from actual returns, that the lead turned out from the furnaces at three diggings, (to-wit: the Platteville, Snake and Dubuque,) already exceeded ten millions of pounds. An estimate of the number of miners, collected from the best sources, multiplied by the probable amount of lead raised by each, also showed that the estimate made at Galena must fall very short of the actual amount produced in this region. Since my return I have received several letters in reply to en-

quiries addressed to the most intelligent smelters throughout the district. These, and the personal enquiries I made in the course of the expedition, enabled me to furnish, with considerable confidence, the following statement of the amount produced from thirty-four furnaces, not quite three-fourths of the whole number which are at present at work in the district:

In Iowa, from four furnaces, 3,000,000 lbs.; in Wisconsin, from 28 furnaces, 18,764,400 lbs.; in Illinois, from two furnaces, 2,000,000 lbs. Total from thirty-four furnaces, 24,764,400 lbs.

In addition to the above, I have ascertained that there are at least twelve other smelters (probably more) whose furnaces are either in full operation or doing an occasional business. From these I have no authentic returns, though I have taken some pains, by letter and otherwise, to procure them. Although many of them are doing a heavy business, yet they cannot perhaps safely be averaged as high as those from whom we have actual returns, namely at 725,000 lbs. each. It might be safe, and is probably below the truth to average them at half a million pounds each, making for the twelve 6,000,000 lbs. This, added to the amount of the foregoing table, gives us the total produce in the year 1839 from the lead mines of Iowa, Wisconsin and northern Illinois, upwards of 30,000,000 of pounds. This result was unexpected by me, yet it cannot, I think, be far from the truth. The smelters, so far as I could judge, had no interest in deceiving me, and appeared frank and candid in their statements.

Again—the number of miners in the district is variously estimated at from two to four thousand, not employed, however, on an average, probably more than half the time. The medium between the two estimates, say three thousand, may be near the truth. As to the average amount which each

man can raise per day, it is difficult to estimate it with accuracy. One of the most experienced miners and smelters in the district writes to me, "two men can raise something near five hundred pounds from veins of average richness. Two men have raised as much as twenty hundred pounds a day, from the richest veins. At McKnight's diggings, near Mineral Point, three men (miners from Cornwall, England,) were seen by one of our party at work on a vein of three inches thick in the solid rock. This did not seem to be considered much more than an average vein, and they were then raising on the average of 1,500 lbs. per day; that is 500 lbs. each."

I may notice a few additional facts which came to my knowledge, regarding the yield of the Wisconsin mines. Some of them are unparalleled in the history of mining. From a spot of ground not more than fifty yards square, upwards of 3,000,000 lbs. of ore have been raised. A drift in Major Gray's diggings, near Mineral Point, in a crevice twelve feet wide, was filled in with clay and ore. When I was there, nine yards only of the contents of this crevice had been excavated, and out of that amount of excavation, 34,000 lbs. of ore had been obtained. At the new diggings near the source of the west branch of the Pecatonica, two men can readily raise 2000 lbs. of ore in a day, and these diggings are not more than twelve feet deep. At Hamilton diggings from two and a half to three millions of pounds of ore were raised from a few acre lots, working to the water, which was to an average depth of twenty feet. At Shaw and Gennett's diggings 1,500 lbs. have been raised by two men in a day.

Upon the whole, I cannot resist the conclusion that the foregoing estimate of the amount of lead now produced in that favored region, is as likely to be below as above the truth.

If then we suppose the amount of lead obtained at 30,000,000 lbs., we are furnished with the data of comparison between the produce of this region and that of mining countries in Europe. The amount of lead produced in the Island of Great Britain in the year 1828 was, according to a statement made by Mr. Taylor, in his records of mining, as follows:

North of England mines,	56,070,000	lbs.
Derbyshire and Shropshire,	10,080,000	"
Devonshire and Cornwall,	4,200,000	"
Flintshire and Denbighshire,	25,200,000	"
Scotland,	2,100,000	"
Ireland, Isles of Man, &c.,	1,050,000	"
Total,	98,700,000	"

The rest of Europe produced 33,000,000 lbs.

If these data be accurate, it follows that the Wisconsin lead mines already produce nearly as much lead as all Europe, with the exception of England; and that they produce one-third nearly as much as England, the great miner of the civilized world. If such be its actual produce, it is difficult to set bounds to its capabilities. A thousand obstacles have hitherto opposed its progress. The temptations offered by the high wages given in Illinois on the public works of that State; these and many other causes have deranged the regular working of even proved mines, and greatly retarded the discovery of others.

But again—this expedition has furnished data regarding the depth and durability of the mines, more trustworthy than the mere opinion of any individual, however intelligent and experienced. In the southern and western portion of the district, the lead-bearing rock, by Dr. Lock's observations, has attained to a thickness of upwards of three hundred feet, grad-

nally becoming thinner as it approaches the northern limits of the district. Now, even in that portion where it is thinnest, the mines are not yet in any instance exhausted. It may be safely inferred in the south and west the supply is for many years, if not for ages to come, inexhaustible.

Upon the whole, a review of the resources and capabilities of this lead region, taken in connexion with its statistics, (in so far as it was possible to collect these,) induces me to say with confidence that ten thousand miners could find profitable employment within its confines. If we suppose each of these to raise daily 150 lbs. of ore during six months only of each year, they would produce annually 150,000,000 lbs. of lead—more than is now furnished by the entire mines of Europe, those of Great Britain included. This estimate, founded (as those who have perused the foregoing pages will hardly deny,) upon reasonable data, presents in a striking point of view the intrinsic value and commercial importance of the country upon which I am reporting; emphatically the lead region of Northern America. It is, as far as my reading and experience extend, decidedly the richest in the known world."

Dr. Owen's report shows other facts connected with this mineral region, which are of importance—namely, that "the copper ore of Wisconsin, in the lead mine region, forms an item in its mineral wealth which would be considered of great importance, and would attract much attention, but for the superior richness and value of the lead." Dr. Owen says, "this occupies the same geological position as the lead ore,"—"it is not a superficial or vagrant deposit, but extends in veins of uniform bearing, and that these veins are continuous, and in all probability extensive,"—that it is found in several localities in sufficient abundance to repay well the labor of the miner—that it compares favorably with the Cornwall (England)

copper mines—that a selected specimen of the best working Cornwall ore yielded but 21 6-10 per cent., while three average specimens of Wisconsin ore yielded from 23 to 35 7-10 per cent. of copper—that there had then (1839) been raised at the Mineral Point mines upwards of a million and a half pounds of copper—that the indications of copper in Wisconsin afford strong presumptive evidence that capital and skill alone are required to render copper mining in this district an advantageous and profitable adventure—and as an additional fact, whereby to estimate the value of the Wisconsin copper ore, that in some of the European copper mines the ore does not contain three per cent., while, as above stated, average specimens of Wisconsin ore yielded from 23 to 35 per cent.," pieces are found weighing from a few ounces to five hundred pounds.

There are found, in the vicinity of the same veins, productive veins of zinc, which usually occurs in the lead fissures. Dr. Owen says "that it frequently happens that the lead fissure gradually diminishes, and eventually is entirely replaced by this zinc ore." I have seen thousands of tons lying in various localities on the surface, which the miners seemed to know nothing about. An analysis of this ore proves it to be a true carbonate of zinc, containing 45 per cent of the pure metal. Sulphuret of zinc, sometimes called blende, and by the English miners black Jack, is also abundant in the Wisconsin mines. It contains from 55 to 65 per cent of zinc, but is more difficult of reduction than the carbonate. We Import a large quantity of brass materials, copper and zinc, from Europe, though the latter is seen thrown about on the surface of the lead region in every direction, and the former is abundant in the state. When we possess these ores in sufficient quantities for home consumption, it would be our advantage to

manufacture for our own use instead of sending abroad for a supply.

The iron ore of this district is of excellent quality, and unlimited abundance, but the richness of the iron veins cannot be well ascertained till mines shall be actually opened, which has not yet been done. But more encouraging or more numerous surface indications of an abundant supply of this useful mineral, can hardly present themselves to the notice of the geologist. In a country more thickly settled, and with skill and capital to spare, these would cause and justify the employment of whole villages of workmen. How little, here in the west, at least, we have improved our natural resources, is proved by the immense quantities of ores, unsurpassed in richness, which lie unsought in Wisconsin. The committee appointed lately to report on this mineral region, states "the same report contains many interesting facts in relation to the connection with the mineral substances, such as coal, building stones, mill stones, chalcedony, agate, jasper, cornelion, porcelain, clay, silver, arsenic, antimony, plumbago, manganese, iron pyrites; also in relation to soils, and their value and productiveness. But the committee have already filled this paper with such copious extracts in relation to the great staple production of the mines, and indeed, as they will show, of the state—extracts, however, well worthy to be brought to the notice, and demanding the careful consideration of the legislator, more interesting by far than anything the committee could say. And in consideration of the disinterested attitude of the geologist, and his world-wide reputation, forcing conviction of the truth of these representations more unequivocally than it was possible to do, by the most voluminous representation the committee could make. They are reluctantly compelled to close the book, and content themselves

by referring to the report itself for more particular information in relation to the the interesting subject of which it treats; feeling that no apology is necessary for the space occupied by the extracts already made. The facts, opinions, theories, and conclusions embodied in Dr. Owen's report, demanding credence and respect, as they unquestionably do, creating an intense anxiety in the minds of the scientific enquirer into the hidden mysteries of nature, as they cannot fail to do, only purport to present the result of a very hurried and imperfect and very general outline reconnoisance of the south-western portion of the state. They lead, however, to the unavoidable conclusion, that if such, and so slight an examination has developed such wonderful results, that although a more minute examination would present still more astonishing results, and what is now demanded by the duty the state government owes to the people of the whole state, is to give them such important information as it is in their power to give, and especially by the duty it owes to the people of the mining region, containing nearly one-sixth of the population of the state, to take the necessary steps to have such an examination made." It appears from the report of actual shipments, during eleven years, that Dr. Owen's estimate (30,000,000 lbs.) is below the truth, the average yearly produce of Wisconsin alone amounting to 41,727,023 lbs., as may be seen from the following tables:

Years	No of Pounds	Value
1841	29,749,909	$1,189,996
1842	29,424,329	1,176,978
1843	36,878,797	1,475,151
1844	41,636,298	1,641,451
1845	51,144,822	2,045,792
1846	48,007,938	1,920,317

1847	50,999,303	2,039,972
1848	49,783,737	1,991,349
1849	45,985,839	1,839,433
1850	41,485,900	1,659,436
1851	34,500,384	1,380,015
Average for 11 years	41,727,023	$1,660,030

It is estimated that at least nine-tenths of the lead shipped at Galena, is raised in Wisconsin, leaving Illinois and Iowa only the remaining one-tenth; and this is more than compensated for by the amount of Wisconsin lead shipped from Potosi, Milwaukee, and Chicago, of which no estimate is made.

Some curious facts, relating to the statistics of the lead region in the south-west portion of our State, may be gathered from the report of a committee, appointed some two years ago, to inquire into the actual state of the mining interests of that particular portion of Wisconsin. The first astonishing fact, established by that committee, is, that in the mining counties, containing a population of only 45,229, at the time, and with a taxable property of about four millions of dollars, the lead product of the year 1851 was $1,380,015, and that of the average for 11 years has been $1,669,080, while the total exports (lead excepted) from the ports of Kenosha, Racine, Milwaukee, Port Washington, and Sheboygan, during the last year (1851) was only $2,039,547, though the counties in which these ports are situated, and those connected with them, commercially, contain a population of 227,996, and have a taxable property of nearly $20,000,000. From these facts it may be inferred that the average produce of lead, for the eleven years above exhibited, would give to every man, woman, and child, in the mining counties, the sum of $36,90, and yield a return of 42 cents on the dollar, on all the taxable property.

On the other hand, the exports from the lake counties, and those commercially connected with them, give to every individual of the population, only the small sum of $8,94, and yield only 10½ cents to the dollar on the assessed value of the taxable property in those counties. From this, it appears that if tested by the criterion of population, the exports of the mining counties, during the above eleven years, exceed those of the agricultural counties in the proportion of about four to one; and if tested by the criterion of the assessed valuation of taxable property, they exceed them in the proportion of more than three to one.

Though these proportions are deducible from the above tables, yet it does not follow that the absolute advantages of the miner over the agriculturist, are as great as these ratios would lead one to suppose. The agriculturist consumes a large portion of his produce in and about his homestead; he sells a portion to the storekeeper, to the miner, to the lumberman, and to others not engaged, like himself, in tilling the ground; and the balance is shipped at the sea port, for sale at a distance. But all the lead raised by the miner is shipped.—Hence it follows that the apparent odds against the farmer, as compared with the miner, are not so great, by which their chances of success approaches to the ratio of equality. It must, however, be acknowledged that no mining region in the known world combines a surface of such fertility, and in every way suited to farming purposes, with a sub-stratum of such mineral wealth, as the lead-bearing district, reported on by the committee appointed for that purpose.

The following table, exhibiting the lead products and population of three former years, is still more favorable to the miner as giving each individual a greater return than that deduced from the above table:

Year.	Population.	Value of lead exp.	Am't to each person.
1845,	12,273	$1,176,073	$95,90
1846,	30,605	1,920,317	62,74
1847,	33,414	2,039,972	60,15

The history of mining affords no parallel to the results here exhibited. In 1845, each individual of the population could count nearly $96, which, if multiplied by the population of 1850, would give the aggregate value of lead exported, $29,000,000. At present, and for some years past, there appears to be a great want of hands to work the mines, owing to the prevalence of the California gold fever, which seduced numbers from our mines, which always yield them good wages. For many years the operations of mining were confined almost exclusively to raising the surface mineral, as that portion of the great land deposite which was not under water, and which could be raised without removing the water—the removing of which required the employment of no other machinery than the pick and shovel of the miner, and his rude windlass. There were, it is true, some few experiments made in removing the water with pumps worked by horse power, and, in two instances, by steam. These experiments proved the fallacy of the opinion entertained by some, that mineral did not exist in the water, and demonstrated that the mineral not only existed below the water line, but that it gradually increased in quality, in proportion to the depth to which it is followed; and there is no doubt from all the information which experience and observation furnish, that the mineral will be found to exist to the depth that the lead-bearing rock extends, which is more than two hundred feet below the bed of the largest stream.

A great portion of the mining district is traversed by deep ravines, from which tunnels might be run to the different lo-

calities containing the ore. Through these tunnels, the water, which so much impedes the operations of mining, might be removed to the depth, in some places, of one hundred and fifty feet. Into these tunnels might be pumped water from a still lower depth, by which the miner would be enabled to carry on his operations to a pretty considerable depth, at a comparatively small expenditure of power or capital. It is very much to be regretted that the lead mines of Wisconsin are not worked with sufficient capital and skill. It is very probable that the want of capital is the chief cause of the rapid decline in mining operations in this State. When I travelled through these mining districts last fall, (1852,) they appeared to be deserted, except where an occasional solitary person was employed digging up the surface, in search of mineral, his only implement being a spade. Wherever a shaft had been sunk, the operations of mining and pumping were conducted on very primitive principles indeed—all for want of skill and capital, both of which might be invested in these mines, with a much surer prospect of a profitable return, than is held out in any other lead region in the world.

It appears to me that the principal lead basins of Wisconsin have been scarcely touched, the miners having confined their operations to the edges of the great deposites, and to the decomposed surface. As to geological science, it is never called into requisition. This is also the opinion of Mr. Phillips, a practical miner well acquainted with these districts. It is to be hoped that a more regular and scientific system will in future be adopted, under the guidance of the State Geologist recently appointed, to explore the mineral treasures of the State.

A company has been recently formed, whose labors are to be confined to La Fayette County, where new mines have

been recently discovered. These mines give great promise of a very rich supply of mineral. Almost every day new mines are discovered, but when the top mineral is picked out, all is abandoned. Two new leads have been recently discovered at Potosi, near Platteville, in Grant County. Lead ore exists in Portage County, on the west side of the Wisconsin River, about two miles from its bank. This mine is supposed to be of tolerable extent, and the quality of the mineral good. This mine has not yet been worked. Lead ore exists in Sauk County, in several localities along the Baraboo Valley. I have seen specimens from the town of Garrison, which contained some lead.

The average price of lead has been steadily increasing, year after year, yet it is to be regretted that the mineral produce is gradually diminishing. In 1847, the price of lead was $3,60 per 100 lbs., and in 1852 it was $4,10 on the levee at Galena.

Zinc, being in general demand for numerous purposes, might be profitably raised in Wisconsin. Where slate is not used for covering buildings, large quantities of sheet zinc would doubtless command a ready market, not only in this and the adjoining States, but in the Atlantic States also. It lies on the surface at the Wisconsin mines, where it is considered a nuisance, while the common brass imported from England contains upwards of thirteen per cent. of that metal. The large quantities of copper and zinc imported into the States, from England, proves how little we improve all the natural wealth which is treasured up in our State like a sealed book. Every day England pours into the eastern cities thousands of tons of iron for rail road purposes, while in Wisconsin it may be found of the very best quality, and in quantity inexhaustible. Immeasurable quantities of iron fragments

may be found scattered over the surface in many of the townships, especially in the Missouri limestone on the Wisconsin River, and so rich as to be perfectly chrystalized. I have seen iron on the surface over a large district, some of it being hematite of such purity as to yield, so far as I could judge without making any analysis, from 40 to 60 per cent. of the metal. Why, then, in the name of common sense, do we import from England, while mountains of this ore are lying useless in many parts of our State, with fuel, water power, and limestone for flux at hand.

There are parts of the district, however, though abounding with iron, which are not favorable to the smelting of that metal, on account of the scarcity of fuel, which is an item in this branch of industry not to be left out of the account. Iron ore of unlimited extent and of great purity may be found at Lake Superior, in the Baraboo district, and at the Iron Ridge in Dodge and Washington counties. This mountain, extending several miles in length, would be sufficient to supply ore in any required quantity, both for home consumption and exportation. A company has been recently organized to manufacture this ore into rails, and for domestic utensils, which cannot fail to realize a good profit on their capital, and confer on the State a lasting benefit. Private individuals* are also making preparations to manufacture iron in this district on a large scale for various purposes. An iron foundry has been commenced at Horicon, where the prospects are favorable.

Few persons are aware of the enormous sums of money sent out of our State for articles of iron. According to the increase of our population, during the last ten years, it is not

*The company lately organized, called the North-Western Iron Co.,—is composed of the following persons; J. L. Bean, Pres., Jonas Tower, James Ludington.

too much to estimate our present population at 570,000. And allowing five persons to every dwelling, we have at present 114,000 houses in the State. If we suppose that each house has two stoves, and that each stove, with pipe and other fixings, average $15, the money sent out of the State for that single article would amount to $3,360,000. Add to this the sum sent out of the State to purchase nails, pots, pans, iron ploughs, tools of every description, rod and bar iron, and numerous other articles indispensable in their use to almost every house-holder, and the aggregate sum would far exceed anything which most persons could form an idea of. The length of rail road now in course of construction, and of others in contemplation, cannot fall far short of 1700 millions, which would require an outlay, in the article of iron alone, of $12,-012,200, which sum, in addition to the above, must be sent out of the State, in the event of our not converting our own resources to their legitimate uses. Very few bestow a thought on the enormous national amount required to purchase articles of indispensable use in every family. Every house has, or ought to have, the following articles: an axe, a hammer, and a spade; and estimating the number of houses at 114,000, the sum required to purchase these would amount to $256,500.

I have dwelt at some length on the money value of articles in general use in our State, from a conviction that all might be manufactured here with greater economy than any where else I know of, on account of the abundance and excellence of our ore, and the quantity of charcoal within our reach, with the facilities which will soon be afforded by our roads and navigable rivers of procuring coal from distant places. The various peculiar properties of iron adapt it, in an unparalleled degree, to thousands of industrial purposes for which no

other metal is available. What art in any civilized nation on earth can be brought to any degree of perfection without the use of iron? Deprive the most prosperous and enlightened country on the face of the globe of the use of iron, and that country must soon sink into semi-barbarism. Take away the plough and harrow, the spade and shovel, the crow-bar and pick-axe from the farmer, and he will be obliged to seek for a living on the running stream, and among the wilds of the forest; to be followed by every one requiring food for his support. Take away from the tailor his needle, from the shoemaker his awl, from the carpenter his tools, from the mason his trowel and hammer, and I ask, to what state society would be reduced. Take from the sailor his [illegible] and he is sure to be ship-wrecked. So it would appear that whether we require delicacy of form, or massive strength; elasticity or rigidity; softness or hardness of material, iron is that material which satisfies all our wants, and fulfills every required condition. It is only where iron can be obtained in abundance, and on reasonable terms, that agriculture can be pursued with advantage; all the trades requiring tools, practiced with success; and civilization advanced amongst a people. Indeed, I recognize in iron one of the chief agents of comfort, convenience, civilization and happiness. Without it, no nation can emerge from a state of semi-barbarism, and the most enlightened must necessarily degenerate.

These various peculiar properties of iron, fitting it so wonderfully for so many uses in all the concerns of life, give it a money value which I deem it necessary to notice, as it will be found to affect the circumstances of this State, as regards the manufacture of iron, which, so far as the ore itself is concerned, costs little; but which, under the guidance of mechanical skill and labor, amounts to sums that but those only

in the business could imagine, or have any idea of. I could not, perhaps, select an example which shows so strikingly the value which skill and labor are capable of giving to iron, more to my purpose, than by exhibiting the result given by Babbage and Fordenburg of five dollars worth of iron when converted into—

Ordinary machinery,	$ 20
Large ornamantal work,	225
Buckles, bellin work,	3,300
Neck chains,	6,930
Shirt buttons,	29,480

To this example of money value given to iron, I shall add another—the quantity of iron used being worth only five dollars :—

Horse shoes,	$ 12½
Table knives,	180
Needles,	355
Pen knife blades,	3,285
Polished buttons and buckles,	4,485
Balance springs of watches,	250,000

The above is the money value given to iron in England by skill and labor; but according to the value of labor in Milwaukee, $5 worth of iron would, when manufactured into horse shoes, come to $18,75. If the other branches of manufacturing industry were carried on in Milwaukee, at proportionably high prices for labor, $5 worth of iron would fetch $375,000. At this rate, the quantity of iron in the "Iron Ridge" alone would be more than sufficient to pay off all the national debt of England. I do not arrive at this conclusion from guess work—the result is found by calculation, founded on tolerably correct data. This, more than anything I am aware of, establishes the honest claim of labor, combined

with skill, to respect. The ore in the ground or scattered over the surface, is literally worth nothing, but under skill and labor, may be converted into the current coin of the country of countless amount. The same may be said of the agricultural soil, or of any other raw material, which, in general, is worthless, till submitted to skillful labor. Hence, skillful labor is the foundation of national wealth.

Iron is found in many other places, but especially at Lake Superior, where its quality is of unparalleled richness. I have seen specimens from Lake Superior, which far surpassed the richest I have seen in any other part of the world.

Copper ore of a singular character is found between the Mississippi and Kickapoo. It is of a light green color, with a waxy lustre and fracture, and very brittle. This ore is disseminated through feruginous earthy matter, composed chiefly of the brown oxide of iron. It was discovered in 1843, on a small tributary which runs west into the Mississippi. This small tributary is called Copper Creek, and the place where the copper was found is only four miles and a half from the Kickapoo. The bed containing this ore is from 12 to 15 feet wide, and from 5 to 7 feet deep, spreading out as it descends the slope, to 30 feet wide. This mine lies well for drainage, and the ore is of a description easily reduced in the furnace, and yields about 20 per cent. of pure copper. The person that discovered this mine, (Mr. Sterling,) sent 24,000 lbs. of the ore to be smelted at Mineral Point, and it yielded 23 per cent. of good copper. Copper ore is also said to have been discovered on the Baraboo, but its geological position has not been ascertained. Carson and Sterling, of Mineral Point, discovered copper not far from the Kickapoo mines, not dissimilar in character to that found at this place.

The lower magnesian limestone north of the Wisconsin

River presents numerous metaliferous indications, more promising than the upper, it being a well known geological fact, that the lower or older rock (all other things being equal,) is more likely to contain metallic minerals than a rock more distant from the source. Lead ore has been discovered in a cherty bed of the inferior part of the lower magnesian limestone, north of the mouth of the Kickapoo River. On the opposite side of the same valley, Hearn and Ward obtained masses of galena weighing 15 lbs. Hearn and Miller discovered some lead ore in the hills at the first great western bend of the Kickapoo, a little below the mouth of Plumb Creek. Half a mile south of the aforesaid, Burns and Miller procured lead ore. Lead ore was discovered in several parts of this locality, and vestiges of ancient diggings made by the Indians are to be seen to this day.

Mr. Randall, to whom was assigned the exploration of some of the tributaries of the Upper Mississippi, found it impracticable to survey, by means, of the needle, some of the localities not far from the Falls of Black River, on account of the large quantities of iron, with which the soil was impregnated.

On the east side of the Chippewa River, and a short distance below Allen's Mills, is an extensive deposite of brown oxide of iron, which is of a variety easily wrought in the furnace. Bennet's Portage, twelve miles above Vermillion Rapids, presents the most important upheaval to be met with on the Chippewa, and from its geological formation, it is more than probable that, when explored, it will be found to repay abundantly for the time devoted to the search. Trappean and conglomerate rocks being considered favorable to the existence of metalic minerals, the idea long prevalent through the Lake Superior country, that hidden treasure is abundant, in

that vicinity, has been more than realized by recent discoveries. The upper rapids on the Bois Brule River is composed of a rock rather peculiar in its character. It is chrystalline, and has iron disseminated through it, with large quantities of labrador felspar.

Pieces of native copper have been frequently found in the vicinity of a trap range upon the St. Croix River. A sample of copper ore from the falls of the St. Croix, was found to contain 5.4 parts of protoxide of copper, 15.5 of oxide of iron, manganese, and alumina. Specimens of copper from the same vein were found to contain 19.72 per cent. of pure copper. On Spawn River a vein of copper ore has been discovered by Mr. C. H. Oakes, of La Pointe, who also found some specimens of native copper in the bed of Rush River. Specimens of black oxide of copper are found in the trap range that crosses near the mouths of Snake and Kettle rivers. In the same locality are large boulders containing native copper. On Left Hand River and its tributaries, copper ore has been found in large quantities. Ten per cent. were extracted from inferior specimens of this ore.

The mineral district of Lake Superior, which is now receiving that attention which its vast importance deserves, lies principally in the State of Michigan, but the discovery of copper ore on the Menomonee, the Baraboo, and Kickapoo rivers, renders the idea probable that the region of country between Lake Superior and the mineral district south of the Wisconsin contains hidden treasures, which time and indefatigable industry will bring to light. Magnetic iron ore occurs in any parts of the State. It is found on the shores of Lake Superior and Lake Michigan. It may be seen on the shore near Milwaukee, and among the rocks disinterred at Walker's Point, in cutting down the hills for grading purposes. I have

observed magnetic iron ore at Sheboygan, at the mouth of the Bois Brule, and many other places.

Good roads and capital would render the Lake Superior district a most desirable place for persons of active habits. Some of the lands are valuable, not only on account of their mineral treasures, but for their heavy timber, which every year is becoming more valuable. The proximity to the great mines, which are now in active operation, and the prime quality of some of the land for farming purposes, are circumstances which must render farming in this region highly profitable. Want of good roads is the great drawback; but from the enterprising spirit of some of the inhabitants, this great desideratum will soon be supplied. A rail road twelve miles long is to be constructed next season from the Iron mines to Carp River, which will facilitate operations considerably. There are employed on the southern shore of Lake Superior 710 miners and copper cutters, 800 surface men and mechanics, and 500 other citizens. Potatoes are worth $1 per bushel; turnips 75 cts. per bushel; hay $25 a ton; oats, in the bundle, $30 a ton. The wages of miners average $50 per month; surface men $26 per month; good mechanics $45 per month; team and driver from $4 to $5 per day. The short canal which will open a ready communication between Lake Superior and the lower lakes, in connection with rail road communication with Milwaukee, as recommended by Col. Whittlesey, late of the United States Geological Corps, will render the Lake Superior district one of great importance.

CHAPTER VII.

Having given the localities of some of the most important minerals employed in the arts, it will doubtless be expected that in a work like the present, a general representation of all the mineral resources of the country shall be given, as well as the extent to which these resources are capable of being developed. To accomplish this, it will be necessary to point out the different species of rocks that compose the surface of the State; the manner in which they are arranged, and the different facts connected with their composition, as regards their adaptation to building, to agriculture, and to other domestic and industrial purposes. In giving this brief outline of the common rocks of the country, and their general arrangement, nothing like a geological essay, full in detail, is intended; my object being simply to show how they may be made available for the purposes just mentioned.

Before entering upon a brief geological outline of Wisconsin, it may be necessary to observe, that one unacquainted with the science of geology may suppose that the rocks composing the crust of our globe are thrown together indiscriminately without arrangement, or order; but upon a closer examination and a wider range of observation, it will appear that the order of super-position among all the rocks is regular and constant, that is, the various strata or layers overlie each other in an unbroken order. In some places, however, a stratum or layer may be entirely wanting, and the order of super-position may be somewhat deranged at the junction of

two formations, arising from some disturbing force. The base, or lowest stratum, is granite, green stone, or some similar chrystaline rock produced, by heat. Above these are deposited the primary rocks, such as gneiss, mica, slate, primitive limestone, &c. Immediately above these are the mountain limestone, the bituminous coal fields, the saline rocks, and the chalk, which are denominated secondary rocks. Above these rocks are the tertiary series, containing a succession of marine and fresh water deposite. And above this last series are found the recent surface deposites. These several strata, resting on the primitive rocks, have been deposited by water in a horizontal position, or very nearly so.

This constant order of succession, with a knowledge of the fact that certain minerals are almost invariably found only in particular formations, gives the geologist an unerring guide to look for minerals where alone they can be found. These rocks, which must have been originally deposited in a horizontal position, are often found inclined to that position, at various angles, some indeed standing vertically. We can easily imagine that the position of these rocks was disturbed by a force from beneath, which elevated them at different angles. This elevating force from beneath has produced its effects about Lake Superior and many other parts of the State. It has elevated many mountains, thrown up islands, and rent rocks asunder. This disturbing force has rendered accessible to us numerous minerals, which otherwise would have remained hidden till the end of time. It has likewise exposed to view numerous fossils, whose presence is an evidence of the identity of geological strata. This force, which at one time might have proved destructive, was destined to produce mineral wealth accessible to millions in after ages.

Subterranean heat once fused the gold of California and

forced it to the surface, where it is now picked up by thousands from every nation, and from every clime. It was subterranean heat that burst the incumbent rock, and forced the fused granite and porphyry to the highest altitude among the Alleghanies and the Andes.

In giving a brief sketch of the geology of Wisconsin, it may be well to divide it into districts, beginning with the mountain or carboniferous limestone, which extends from Lake Michigan west and north-west to the geodiferous, or, as Dr. Locke calls it, cliff limestone, and to the sandstone formations. This extensive limestone district extends from Mackinaw along the lake shore till it dips under the rocks of the coal formation in the State of Illinois. These two points limit its extent in a north and south direction. The very few organic remains it contains indicate its affinity to the carboniferous limestone formation which forms the basis on which the coal-bearing rocks rest. As the order of super-position of rocks is never inverted, the position of these deposites, which is nearly horizontal, holds out no great prospect of supplying coal to any great extent. What were supposed to be small fragments of coal were found in the vicinity of Lake Winnebago and at Milwaukee, but what I have seen in these places was only common shale.

The limestone of this eastern, or Lake district, when burned, affords very pure lime. Its appearance in the quarry would lead one to suppose that it contains a considerable quantity of earthy or sandy particles, which however is not the case. It occurs near the surface in many localities. I have seen it at Waukesha, in the township of Lisbon, up the Menomonee River, and other places; some of it splits with a tolerably straight edge and of nearly equal thickness. Though this stone is very rough, yet some of it answers well

ing purposes, and for side-walks. In Waukesha, it is full of nodules of flint, which give it the appearance of a brechia. The quarry at Waukesha contains fossils, not, however, in great quantities. The color of this limestone is a light grey, but in some places, it is of a dirty yellow color. The facility with which some of this stone crumbles, under atmospheric influence, and the difficulty of cleavage render it unfit for building. In general, it presents a very uneven surface, and, in most cases, is full of cavities. It is easily burnt, and makes good lime. Two or three lime-kilns in the vicinity of Milwaukee are doing a good business.

This limestone contains pyrites of iron, in some places, in great abundance, and sulphuret of zinc, and gypsum, or plaster of paris, which is well known to be of great value to the farmer. Cavities have been found in this rock along the lake shore, containing bitumen, both liquid and solid. In the former state it is not found in sufficient quantities to warrant an outlay of time to collect it for medicinal purposes. Mr. Lapham says, "it appears to result from the animal matter of the putrifactions found in the rock." This, however, is doubtful. It must have resulted from the decomposition of wood and vegetable matter.

Water lime is found in Jefferson County, which is represented as very good, and promises to bring a considerable profit to the owner. I have seen water limestone on the bank of the Rock River, near Janesville. It is found under the sandstone, and over a silicious rock, which I describe in another place, as fit for making glass. Iron pyrites are found in large quantities in the rock, which might become of some importance in the manufacture of oil of vitriol; iron pyrites being a substitute for sulphur.

Marble has been recently found in Manitowoc County, which, it is hoped, will be a source of profitable employment. Its color is white, and it takes a good polish ; but the extent to which it runs is not known. The quarry is to be worked in the course of the present year. I have seen a specimen of good white marble from the Lake Superior district. Time will disinter quantities of this rock. A block of marble was sent from Richland County, to be placed in the Washington Monument, which is said to be of good quality.

A bed of potters' clay, equal in quality to any in the Union, and inexhaustible in quantity, has been discovered on the banks of Fox River, between Appleton and Neenah.

Milwaukee produces brick clay of a very superior quality and beautiful color, somewhat resembling cream color. There are several kilns in full operation in the vicinity of the town, which supply it, as well as other towns, with large quantities of brick for building purposes. These bricks are now generally used in the better class of houses instead of lumber. Besides the durability of brick, as compared with lumber, the protection it affords from fires, and its appearance, ought to be sufficient to recommend it ; and more especially when its price does not considerably exceed that of lumber. A machine was employed in one establishment, which turned out 30,000 bricks in 10 hours. This machine presses the brick without any previous tempering. The clay is thrown from the bank into a sort of hopper, out of which it escapes into the moulds, where it is pressed into form, having been previously pulverized in its passage from the hopper to the moulds. Most of the other establishments, if not all, have moulds which turn out bricks, beautiful in appearance, and of great durability. The principal brick kilns are owned by Messrs. Burnham, Kinlan, Corcoran, Carney, Messenger, Neiderman, and Shinbone.

The Milwaukee brick is now well known in New York, Chicago, and other large towns, where it is used to set off the appearance of their first class buildings.

Bricks are made at Kenosha, Racine, Sheboygan, Whitewater, and numerous other places throughout the State. I have seen some bricks made in Washington County, which resemble the Milwaukee bricks.

Seventeen millions of bricks are made in Milwaukee in the year, which gives employment to a large number of hands, and leaves a good profit to those engaged in the manufacture. The ordinary brick is sold for $4,00 per thousand, and a better sort, used in facing, for $12,00. From the superiority of the Milwaukee clay, brick-making cannot fail of being ranked among the most important branches of manufacturing industry in the State. It may be manufactured in any quantity along the Menomonee River, which can be made navigable for boats at a small expense, by which the expense of cartage might be saved. A tram road from the kiln to the edge of the water would reduce the expense.

Large boulders of granite, green-stone, and others of igneous origin, are occasionally met with, lying on the surface. Being generally found water-worn, these erratic blocks must have travelled some distance, no doubt from some of those northern districts containing these primitive rocks. In cutting down the bluffs round the city of Milwaukee, for the purpose of grading the streets, several of these boulders are exposed to view, especially at Walker's Point, where likewise may be seen a few large blocks of limestone, which show no evidence of having travelled any distance; as they all present unimpaired angles. All these must have been brought to their present position at the same time, as they are found imbedded together in the clay forming the bluffs. During or

subsequent to the geological period in which these comparatively recent deposites were formed, extraordinary currents from the north must have existed, bearing with them, in their impetuous course, those ponderous rocks in thousands, many of them, probably, embedded in fields of ice. These northern waves have produced similar effects in many parts of Europe. The limestone districts of our State show evidences of this northern current. Large boulders may be seen in the town lands of Greenfield, Oak Creek, Milwaukee; in the counties of Sheboygan, Jefferson, and indeed in most of the counties comprehended in the carboniferous limestone disstricts. In some places, however, only very few are seen on the surface, and in no place do they interfere with the operations of the former, to any injurious degree. The soil and subsoil of this district are, in general, clayey and calcareous, with a large proportion of vegetable mould, and, in many places, mixed with water-worn limestone pebbles, from the size of a marble to that of a goose egg, and some much larger. The subsoil of numerous localities, which I have seen, is composed of this diluvial deposite, derived altogether from the limestone rock. This drifted deposite is of considerable depth in some places, and, from its small size, might be used with great advantage in making the public roads, and especially where it is found of a quality sufficiently hard, and unmixed with the soil.

The largest drift formation in the world is found in Wisconsin; extending from Lake Michigan, near Green Bay, to the Mississippi River, and passing east of Fond du Lac, Watertown, and Whitewater, continuing its course right through Illinois to the Father of Waters. Whether it crosses the Mississippi or not, I cannot say. This extraordinary formation, so far as I examined it, is composed of rounded lime-

stones, mixed with calcareous earth. Its width varies from less than a mile to three, and its height from forty or fifty feet to two hundred. Its direction is somewhat north and south, inclining east of south and west of north. Many parts of this great range would appear to be made up of innumerable hills, with deep hollows between, which inclines me to believe that these little hills were transported in fields of ice, which, upon being broken, or dissolved, dropped their contents right beneath the points where such an occurrence happened to take place. A continuous current, in the direction of this curious ridge, could not, by any physical law, have produced a range presenting such a diversified surface, without the agency of icebergs.

The northern current has transported large pieces of pure copper, probably from the mineral district of Lake Superior, to our limestone district. Among these was a remarkable specimen, found at Green Bay, over 100 pounds weight. Another piece, weighing 30 pounds, was found by Mr. Trowbridge, on his farm, near Milwaukee. In excavating the canal at Milwaukee, pieces were found, at the depth of ten feet, which, together, weighed 20 pounds. One of these specimens is deposited in the cabinet of Yale College, at New Haven. Small pieces are occasionally found at Racine, and other places, and "a mass is said to exist a little west of La Vieux Deserte, far exceeding in magnitude the celebrated copper rock from the Ontonagon." These isolated erratics, thus straying from their native beds, cannot be regarded as among the sources of wealth of Wisconsin; they however strengthen the evidence in favor of the existence of copper and of a northern current, which has left thousands of ponderous land marks, not only in several parts of Wisconsin, but in many other northern States—all proving the ex-

istence of a powerful force exerted at a somewhat recent geological period in a southerly direction.

Causes at present in operation transport large masses of ice, containing fragments of rocks, clay, &c., from the polar regions, toward the south. These boulders have not been observed farther south than Ohio.

Just after having written the last sentence, I read an account of a piece of copper found by Mr. Tunis J. Burhyte, of Empire, while digging in a cellar. This contains 95 per cent. of pure copper, and weighs 120 pounds. A number of specimens were found in the same region, on the Ledge, and also in Eden and Osceola. A very fine piece was found at Waupun a short time since.

Sulphate of barytes, sometimes called heavy spar, is found in boulders or in fragments of limestone on the Wisconsin River. Calcareous spar, forming rhombs, is found in the limestone at Neenah, as also at the mines, and at several other places. Calcareous tuffa occurs in the canal, near Milwaukee, incrusting moss, leaves, and such other vegetable matter as may come in contact with it, under favorable circumstances. Tuffa must be found in many parts of this State, where so much calcarious matter abounds.

The shore of Lake Michigan, within the county of Milwaukee, consists of a bank of reddish clay, varying in height from 20 to 100 feet, and standing over the lake in a very erect position. From the lake, the country continues to rise to the dividing ridge between the lake and Rock River, flowing into the Mississippi. West of this dividing ridge, the country maintains nearly a uniform level, inclining a little toward Rock River. This summit is considered as the lowest point in the dividing ridge between the Mississippi and the

two lakes—Michigan and Superior—except at the Portage, between the Neenah or Fox River, and the Wisconsin.

The face of this great limestone district is not considerably broken up by deep ravines, or diversified by mountains, the surface being what is termed rolling. The beds of the rivers traversing this district are not considerably depressed below the face of the surrounding country. All the east and north-east, with a considerable portion of the north-west of the limestone district is timber land, and most of the south and west prairie and oak openings.

The next district is the great magnesian or cliff limestone, which, though sparingly developed elsewhere, "swells, in the Wisconsin lead region, into the most remarkable, most important, and most bulky member of the group." This great deposite of magnesian limestone attains to the thickness of 550 feet, whilst the underlying blue limestone shrinks in some places into a mere string scarcely 100 feet, and in others it seems entirely wanting—(the blue limestone crops out at Fever River, above the thriving town of Galena, in the State of Illinois.) It is found here in place in limited quantity, and the specimens I saw contained numerous fossil remains, similar to those found in the mountain limestone of Ireland. It contained a small quantity of silicious sand, and was very hard and compact. This is the only specimen of blue limestone I met so far south. The surrounding locality is rich in lead ore, which probably formed the foundation of the prosperity so long enjoyed by the commercial city of Galena, which, for its size, is the wealthiest and most prosperous place in this or, perhaps, in any other country. The enterprising spirit of its inhabitants deserves far better accommodations than is afforded by its shallow river, narrow and irregular levee, and confined streets. The inhabitants have

made the most of the small space between the almost insurmountable bluff behind the business part of the town, and the little stream which bears such a numerous fleet of flat-bottomed steamers, as no town I know of, of double the size, could require to carry on its trade.

The trade of Galena must be transferred to Dubuque as soon as the rail road, now in the course of construction, shall have reached so far; and when the works now in progress to improve the landing at Dubuque, shall have been completed. The landing, at present, at Dubuque, is very bad; but, by engineering skill, may be made to answer all the purposes which its increasing importance may require. This point must be the centre of a vast district, and from it must radiate all the commercial business at present done at Galena. The Janesville and Dubuque, as well as the Milwaukee and Mississippi rail roads, add considerably to the importance of Dubuque. Its mineral resources and its position, must secure to it a very extensive trade, when all the works in actual progress and in contemplation shall have been completed. The town has a respectable, substantial appearance, and contains hotels which deserve the high character which they bear.

The black slab, which is generally found resting on the cliff limestone, is wanting. Throughout the entire district of country explored by Dr. Owen's party, it is doubtful whether the fine-grained sandstone, or oolitic limestone, or the conglomerate, can be detected. From this it appears that the magnesian limestone, with the thin substratum of blue limestone, and some coarse-grained sand-stone, engrosses the entire mountain limestone group. The coal measures occur in the southern boundary, in immediate contact with it, instead of being separated, as in other places, by three distinct members, occupying many hundred feet. This

district is very peculiar, in a geological point of view, from the enormous developement of this member, and the complete obliteration of all the other members of the mountain limestone group, except the underlying blue limestone and sandstone already mentioned. In the north of this district, the magnesian limestone runs out, and the underlying blue limestone and sandstone come to the surface. In the south it runs under the coal measure of Illinois. East, it is covered up by recent depošites, and west it is occasionally exposed in the beds of the streams and rivers, and in projecting cliff. This district then belongs to that group, or formation, called transition, and sometimes secondary. It is sometimes ranked amongst the carboniferous, metaliferous, encrinital, and mountain limestone group. Local terms, adopted by different geologists, tend to obscure and retard the science of geology. Terms of general import, and not founded on local circumstances, ought to be chosen, and their meaning defined, like the technical terms of the exact sciences. The external character of this lead-bearing district no doubt warrants the assumption of the term, cliff, but the term does not apply to the same formation in other localities, where the external character bears no striking resemblance to the Wisconsin limestone cliffs. Dr. Owen, an able geologist and accomplished scholar, gives the following luminous description of the external character of what he calls the cliff limestone, along the Mississippi :

"These mural escarpments, exhibiting every variety of form, give to the otherwise monotonous character of the landscape in Iowa, a varied and picturesque appearance. Sometimes they may be seen in the distance from out of the rolling hills of the prairie, like ruined castles, moss-grown under the hand of time. Sometimes they present, even when

more closely inspected, a curious resemblance to turrets, and bastions, and battlements, and even to the loopholes and embrasures of a regular fortification. Sometimes single blocks are seen jutting forth, not unlike dormar windows, rising through the turf-clad roof of an old cottage; and again, at times, especially along the descending spurs of the hills, isolated masses emerge in a thousand different forms, in which the imagination readily recognizes the appearance of giants, sphynxes, lions, and innumerable fantastic resemblances."

The district round Mineral Point, the Blue Mounds, the Wisconsin side of the Mississippi, and many other places, present similar appearances.

The manner in which this rock wears under atmospheric influences modifies its form. Numerous silicious fossils and masses of chert are interspersed through this rock, which, when acted on by the weather, fall out, leaving cavities innumerable, and giving the rock a rugged appearance. This process sometimes undermines portions of the cliff, often leaving it bearing on a weakly pillar, which every moment threatens to give way, and precipitate the incumbent mass down the fearful steep. Part of this rock is very hard and durable, and makes some of the best building stone to be had anywhere. Quarries are opened at the Sinsinawa Mounds, at Mineral Point, at the Four Lakes, and at the Pecatonica. The last, however, is not very good. The best building stone occurs in the lower portions of the upper beds of the cliff limestone. It can be quarried from six to twelve inches thick, and presents beautiful straight edges, a smooth face, and a light yellow color. This rock may be had of almost any required thickness, and horizontal extent. It is similar to the stone of which the two Houses of Parliament, in England, are built.

Two and a half miles from Madison, on the road leading to the Blue Mounds, is a quarry of white sandstone, surmounted by limestone, which makes good lime. This dips towards the north-west. Some brown sandstone occurs here, which comes out of the quarry in large blocks, and is exceedingly hard. The material from this quarry is employed in building the new bank and hotel at Madison. It is a beautiful, close-grained, milk-white stone of great durability. These rare qualities, combined with the architectural taste displayed in these buildings, will add considerably to the appearance of the town. A good hotel will be an additional inducement to strangers to visit Madison and its surrounding scenery, and a bank, conducted on liberal principles cannot fail to prove a great convenience, and advance the general interest of the town and surrounding country. In this quarry I observed vertical cracks, which have been formed by the shrinking of the mass when drying. Such cracks as these may be observed in every soil, especially clayey, after having been drained.

I have seen excellent quarries at Mineral Point and Galena, composed of magnesian limestone, resting on sandstone. The rock in these quarries cleaves in large blocks, but is coarse grained, and the color a dirty yellow. I have seen specimens of sandstone at Mineral Point, of excellent quality and good color, which, I was told, had been quarried in that neighborhood. A small marble quarry has been recently discovered in Grant County, near Potosi. The marble is nearly white, and is considered of good quality. Few counties in the State can compete with Grant County in mineral wealth, and the discoveoy of marble will add considerably to its industrial resources.

Water lime is found in Jefferson County, which is represented as very good, and promises to bring a considerable

profit to the owner. The quarry at Janesville, containing water lime, deserves more than a passing notice. In the neighborhood of this rising town, on the opposite side of the Rock River, is a quarry which is worked for various purposes. The upper five feet of the quarry makes good quick lime; the next five feet are impure limestone mixed with sand, and are used for building purposes. The next two feet and a half are composed of the same description of stone, which is cut to any required size, for ornamental and useful purposes, such as door-ways, window-sills, &c. The next two feet are sandstone, fit for building, and may be cut to any required size. The color is not good, but in other respects, this rock makes a good and lasting building material. It rests on twenty-two inches of water limestone, which last rests on pure sand fit for the manufacture of glass. I had no means of ascertaining the depth of this last rock. A building has been recently erected at this place, intended for a sawing mill to be worked by water, which cannot fail to be a source of considerable profit to the proprietors, as the lime and sandstone of this quarry are distinctly stratified and very easily quarried, and moreover it lies high above the bed of the river, which washes its base, and waters the town. It is, however, in common with the limestone of the surrounding district, very coarse-grained. It dips a little to the S. S. W., but is perfectly horizontal, when viewed from the river. I have seen specimens of stone found in the neighborhood of Janesville, which is used as Pilasters and supports, supposed by the inhabitants to be marble, but has no claim to that name, being no better than a coarse limestone, good, however, for building purposes, as it easily splits into blocks, limited only in thickness; the other dimensions being sufficiently ample for any industrial purpose, where stone is required.

Magnesian limestone has not yet been found east of Whitewater, where I have observed it exposed by grading operations. A good quarry is worked at Waupun, a small village on the line between Dodge County and Fond du Lac. The stone comes out of this quarry of any required size. Portland, in Dodge County, has also a good quarry.

Three miles from Omro, a superior quality of glass sand has been found. Samples of it have been sent to the Lancaster Glass Factory, Erie, and New York, and it was found to be of very superior quality. A company has been formed, styled the "Omro Glass Company," which will manufacture glass at that place. This being on the Fox River, which will soon be navigable to the Mississippi, and Lake Michigan, by Green Bay, the article may be easily shipped in any direction for sale. Nothing will tend to improve the industrial interests of the State more than the erection of such works, under the guidance of a company with sufficient capital.

A white rock, which, by disintegration, forms a white plastic material used in the manufacture of porcelain, is found in the Mineral Point and Blue River lead mines; besides several other places. Should it exist in sufficient quantities, it would prove a valuable addition to that peculiarly favored region. This material is a hydrate of silica, containing a small per centage of alumina. It likewise contains veins of so bright a green as to give rise to the idea of the existence of copper ore, but when tested, it contained none of that metal.

Upon the side of the river opposite to Prairie du Chien, is a stratum of sand stone, identical in character with that 300 feet higher. The following is a geological section, extending from the top of the eastern mound (Blue,) to the Wisconsin River at Helena, taken from Dr. Locke's report:

	Feet.
1. Chert, hornstone, flint, at top,	410
2. Magnesian (cliff) limestone,	169
3. Blue fossiliferous limestone, very thin or wanting,	000
4. Sacharine sandstone,	40
5. Alternations of sandstone and limestone,	188
6. Sandstone, variable and not well defined,	3
7. Lower limestone, probably magnesian,	190
	1000

This lowest bed of magnesian limestone, as well as the upper, is a bad burning rock. Till the upper rock shall have been exhausted, no shaft will extend to the lower; and from the inexhaustible quantity, comparatively, near the surface, countless ages may pass away before the miner will be driven by necessity to the lower bed. Time, however, can only determine this.

The magnesian limestone district has a vast extent of prairie and oak openings, with groves here and there, especially on the rivers and streams. Blue Mounds—two conical hills, the one in Dane, and the other in Iowa County—are the most conspicuous objects in the whole landscape of Wisconsin. The Indian name of these mounds signifies smokey mountains, applied to them on account of their summits being sometimes enveloped in clouds, which, in Wisconsin, from the absence of high hills, is a rare phenomenon. These mounds stand almost one thousand feet above the Wisconsin River, at Helena, as has been shown in the last table, and are covered with vegetation to the top, from which there is a view of the surrounding country, extending far beyond the Wisconsin on the north, and embracing a wide circle all around." These mounds are twenty-five miles west from Madison, and twelve south from the Wisconsin River.

The Platte Mounds are somewhat similar to the Blue Mounds, which they would feign to rival. They are situated near the north-west corner of La Fayette County, and are rendered historical from the circumstance of that point having been chosen for a temporary fortification, built during the Black Hawk War, in which Lieutenant Force fell by the hand of an Indian, near this spot, where the fallen soldier's grave may be seen to this day. These mounds, as well as the Blue Mounds, are supposed to have resisted the abrading influence of the water and atmosphere, on account of the durability of the rocks of which they are composed, while the surface of the surrounding country has been worn down and washed away, as being composed of softer and more friable material. "These mounds rise above the general table of the country to the height of from two hundred to four hundred, or even to six hundred feet." Before I had seen these mounds, I was inclined to think that they were the result of some elevating force. This would be an easier solution than to suppose the surface of thousands of miles of the surrounding country to be washed away to the depth of some six hundred feet. But having closely examined these mounds, and the surrounding district, I was constrained at once to abandon the theory of elevating force from beneath. I have known some instances in Ireland of conical hills protruding through a limestone district, changing the character of the limestone in immediate contact with the igneous rock. Carrigoguinal, on the river Shannon, near Limerick, is a perfect illustration of this upheaving force. This rock stands in the midst of a flat limestone district, and is visible at a considerable distance, its circumference being, as far as my memory serves me, no more than about a quarter of a mile. The limestone rock in contact with its base has been completely metamor-

phised by the action of heat. Had the force which shot this igneous rock through the limestone been less violent, and extended over a wider space, a conical mound might have been formed similar to the isolated mounds of Wisconsin. But the stratified rock on the top could not have retained their original position, as at the Blue Mounds. Some derangement of the limestone rock would be visible, but volcanic action is visible by the derangement of the strata, at Carrigoguinal, and the metamorphic effect of heat, is seen all round. At the Blue Mounds, the stratification is perfectly horizontal to the very top, except at the most elevated and conical one, where the rocks seem to dip in different directions, in conformity with the shape of the cone ; but on a close examination of this mound, these rocks are tilted by the wearing away of the surrounding support, and some of them have tumbled over. The other mounds near this, not being so steep, retain the stratification to the top in a perfectly horizontal position, so far as the eye is able to judge. On approaching these mounds, I observed, close to the middle one, four or five large, denuded blocks, which I mistook for small houses, and another one, near the eastern cone, standing in a reclining position, with a broad head, which I mistook for a tree. This, in a comparatively short time, will tumble down the precipice. The flinty appearance of the rock on the top of these mounds has been caused by the infusion of silicious matter into the porus rock by water. The view from the top of the mound is so eloquently described by Gen. Wm. R. Smith, that I am induced to give it here :

" An ocean of prairie surrounds the gazer, whose vision is not limited to less than thirty or forty miles. This great sea of verdure is interspersed with delightfully varying undulations, like the vast waves of the ocean, and every here and

there sinking into the hollows, or cresting the swells, appear spots of wood, large groves, extensive ranges of timber, small groups of trees, as if planted by the hand of art, for ornamenting this naturally splendid scene. Over this extended view, in all directions, are scattered the incipient farms of the settlers, with their luxuriant crops of wheat and oats, whose yellow sheaves, already cut, form a beautiful contrast with the waving green of the Indian corn, and the smooth dark lines of the potato crop. Throughout the prairie, the most gorgeous variety of flowers are seen rising above the thickly set grass, which, in large and small patches, has here and there been mowed for hay; all presenting a curiously chequered appearance of the table beneath us. The mineral flower, the tall bright purple and red feather, the sun-flower, the yellow bloom, the golden rod, the several small and beautiful flowers, interspersed with the grass, render the scene indescribably beautiful. To the north, Wisconsin hills are seen bounding the view; to the east, prairie and wood are only limited by the horizon; and the Blue Mounds, on the north-east, form a back ground and land mark; to the south, the view over the rolling country extends into the State of Illinois; in the south-west, is seen the Sinsinawa Mound; the view to the west is only bounded by the Table Mound, and the hills west of the Mississippi, and distant about thirty miles; while to the north-west, the high hills, through which the Father of Waters sweeps his way, close the view. Below us, on the plain, is the little village of Belmont, with its painted dwellings; the brown lines in the broad green carpet, indicate the roads and tracks over the prairie; the grazing cattle are scattered over the wide surface, looking like dogs or sheep in size; while in the distance are seen wagons of emigrants and ox teams hauling lead, merchandize and lumber; the horseman

and foot traveller are passing and repassing; pleasure and travelling carriages are whirling rapidly over the sward, as if the country had been improved for a century past, instead of having been only five years reclaimed from the savages. This picture is not exaggerated. It fails of the original beauty, in the attempt to describe the scene, which is worth a journey of a thousand miles to contemplate in the calm sunshine of a summer day, as I have viewed it from the top of the Platte Mounds."

The face of Dane County is diversified by hills of moderate elevation, with corresponding valleys, the principal occupying the Four Lakes, and their outlet. The capital of the State is situated in this county, of which I shall soon have occasion to speak. Chalcediny, agate, and cornelians have been found on the margin of Fourth Lake, near the capital. Green County, which lies south of Dane, is, like it, broken by moderate hills which are susceptible of cultivation to their tops. This County is in general well adapted to all the purposes of agriculture. The surrounding country hereabouts is a good deal diversified by hills and valleys, owing to the fragile nature of the limestone on which it rests. "North of the main ridge the limestone is succeeded by the underlying sandstone, forming cliffs of a wild and picturesque appearance." On the summit of this ridge passes the main road.

The district round the rising city of Portage is composed of a sandy soil, which yields much better crops than could be expected from its appearance. This sandy region is very extensive. Portage is destined to become a place of some importance from its central position on the canal connecting the navigable rivers, Wisconsin and Fox.

CHAPTER VIII.

The next subject which shall engage my attention, is a description of the formation of the Upper Mississippi, commencing at Prairie du Chien, which is built on a plain north of the Wisconsin River. Viewing the valley of the Mississippi up towards the north, a range of geological terraces may be seen converging in long lines of perspective, which continue to rise as you ascend the valley, and especially in going north towards the Kickapoo. Though the strata actually rises in these directions, yet the face of the country retains nearly the same elevations; from which it follows, that, one after another, the superior beds thin out and disappear, and the lower blue limestone, sandstone, and magnesian limestone gradually emerge from beneath the water courses, and are ultimately found capping the adjacent hills, as may be seen near the mouth of Plumb Creek. Travelling still farther north or north-east, very thin beds of magnesian limestone are seen capping the crest of the hills; and going a little further, the stratum runs out, and is succeeded by the next inferior stratum. Though the surface stratum runs out, yet, at some distance, it is found again to thicken. The lower magnesian limestone, at the bend of the Mississippi River, nearly runs out, and it again thickens farther north, near Bad Axe River. Between this and Prairie La Crosse the northerly rise again sets in, so that sandstone constitutes the great body of Mountain Island.

A few miles below this, the principal axis of the Upper Mississippi commences, where the strata again descend towards the falls of St. Anthony. Between the entrance to Lake Pepin, the lower sandstone and lower magnesian limestone stand at the height of forty feet, and at the great bend of that lake, the top of the eminence stands at the same height. This order of superposition continues till we go three miles below Vermillion River, where the sandstone disappears, the magnesian limestone occupying the whole way from the river to the top of the cliff. The sandstone again emerges from beneath the water, three or four miles above the mouth of the St. Croix. The lower magnesian limestone extends up the rivers Carron and Vermillion.

The scene depicted by nature on the main branch of the Chippewa, about fifty miles from its mouth, is by no means devoid of beauty. Being based on a soft sandstone, the surface is covered with disintegrated sand in every direction. The Chippewa River has laid bare, on its north side, a bank of light yellow sand to the depth of forty feet. This sandy soil gives no great promise to repay the farmer for his labor, containing only a small per centage of organic matter, while it contains a very large per centage of insoluble matter, composed chiefly of fine white sand, and only a very small quantity of soluble salts, chiefly oxide of iron and alumina, with but a mere trace of lime. In some places, however, it is far more productive than its appearance would indicate, on account of a larger admixture of calcareous drift, derived from the magnesian limestone. "A similar belt of land extends from the Chippewa to the Black River and Prairie La Crosse River." This tract lies nearly parallel with the Mississippi, distant from it about twenty miles, and averages in width from forty to fifty miles. It diverges from Prairie La Crosse

to the east, and crosses the Wisconsin River between Point Bass and the Dalles. From the Menomonee, this sandy belt runs north and north-easterly, towards Apple River, but receives a large quantity of calcareous matter, which improves its character. This sandstone district being interstratified with magnesian limestone, the action of water undermines the harder rocks, leaving overhanging ledges and caverns, which are the favorite resort of reptiles, which are seen in multitudes here, as well as at the Mississippi, below Lake Pepin, basking in the sun, at certain seasons of the year. In such places the traveller should be cautious.

A striking analogy exists between the physical features of the country occupied by the lower magnesian limestone and that of the district before described, and occupied by the upper magnesian limestone. This resemblance, no doubt, is owing to the similar chemical composition of both rocks. The soil derived from the decomposition of both these formations is of excellent quality, being rich, not only in organic matter, but also in those mineral salts which confer durability and give rapidity to the growth of plants. The immediate vicinity of the streams is in many places rough, but the rest presents a sufficiently level surface for agricultural purposes. But from Lake Pepin south, to the upper Iowa, the surface is considerably broken; not too much so, however, for grazing purposes. This region is adapted to the breeding of sheep.

The streams in this district are amply supplied with trout, and the rivers with bass, carp, sunfish, pickerel, pike and catfish. On the prairies are deer, grouse, pheasants and partridges; and the streams are visited, at the proper season, by immense flocks of wild geese and ducks. The soil is of good quality between Turkey and Yellow rivers, in the eastern part of the Winnebago reserve, but is deficient in timber.

The physical and agricultural features of the upper Iowa are somewhat similar to those of the district just described, as regards the land, a few miles below the Big Spring. The upland prairie between the upper Iowa and Turkey River is of second rate quality, and the surface undulates ; the want of timber is a great drawback.

Between Turkey River and the head water of the Wapsipenicon, and beyond that stream to near the Red Cedar, the country is rather marshy, but level, and deficient in timber. In the interior of the Chippewa land district, the features of the country vary with the change in the geological formation. A little before reaching the igneous ranges, the streams run between solid walls cut into the sandstone, known in that locality by the name of Dalles. In this region may be seen granite, sienite, greenstone, hornblende, gneiss, and mica slate. Chloritic and talcose rocks are also to be occasionally found in the region.

The most southerly point at which granite rocks occur on the tributaries of the Mississippi, is on the Black River. Having passed the east fork of the Black River, the primitive rocks extend nearly to the top of the highest hills, pebbly sandstone occurring here and there. The soil and timber at this place are considerably improved. After crossing Cunningham's Creek, the granite is replaced by gneiss, which extends five or six miles. "After the fourth principal meridian crosses Black River, no rocks, but boulders appear on the surface for sixty miles."

It is not easy to define the boundaries of the sandstone region of Wisconsin. It occupies a large tract, resembling a crescent, commencing in the St. Croix district, and extending to the Menomonee, the broadest part being on the Wisconsin River. This sandstone is supposed to be identical

with the Pottsdam sandstone of New York, from the discovery of fossils, characteristic of both, not far from Lyons, in Sauk County. This rock is supposed to be the oldest containing fossil remains. The northern parts of the State rest upon primary and other rocks of igneous origin, such as granite, trap, &c. This region is principally covered with pine.

In a work like mine, I find it impossible to give a connected geological statement of facts; as in connection with such facts I was often obliged to branch off into some other subject relating to the industrial resources of the district under discussion. The economic geology of the State, therefore, could not be continuous without losing more time in the arrangement of the work than I could spare.

The igneous ranges show themselves first in the beds of the east branch of the Chippewa. In all this region of country, rapids are numerous, and water-power extensive, with occasional groves of good timber. In the Lake Superior region is found good maple timber, indicative of good land; the surface is much broken, but not so much so as to render it unfit for agricultural purposes. There are numerous ponds or morasses in many of the hollows, and sometimes, on very elevated situations throughout this region, of trap formations, Similar ones occur in Michigan. From their circular form, and having no visible outlet, these are supposed to be cracks for the exit of lava. About a quarter of a mile north of the trap rock range, sandstone conglomerate makes its appearance. The maple land in the vicinity of the east fork is of good quality.

The bays on Lake Superior are sandy; the crests of the hills rocky, composed of sandstone and marly beds. A variety of opinions have been advanced regarding the age of the conglomerates, marls and red sandstone of Lake Superior.

Some believe them to be contemporaneous with the new red sandstone of Great Britain, and others refer them to the oldest sandstone of the New York system. As no organic remains are found here, it is difficult to decide this question. Dr. Owen, however, is of opinion, that from lithological and mineralogical character, these rocks may be referred to the new red sandstone of England. Twenty miles south of St. Louis river, fine pine timber may be seen, and also, on the heights, good sugar maple.

Lake Superior is the largest body of fresh water in the world, containing, according to official report, 22,000 square miles. Its surface is elevated 596 feet above the ocean level, while portions of its bed are several hundred feet below it, thus making it one of the deepest depressions on the face of the earth, excluding those portions covered by the ocean waters. Its greatest length is 400 miles, and its greatest breadth 160 miles. It contains but few islands, some of these being of igneous origin. At a period not very remote, a strong current swept one of these islands in a northwesterly direction, grinding down the softer beds, and polishing and grooving the hardest materials ; the grooves being perfectly distinct and well defined over a large extent. I have seen specimens whose surfaces were so definitely marked, that one would suppose they had recently left the hands of the engraver, their angles having suffered so little from the ordinary action of the elements. Six miles from Milwaukee, up the Menomonee River, is found a limestone well polished and beautifully fluted, all the grooves running perfectly parallel to one another, no two of them, however, being of the same breadth or depth. This stone is the best I have seen in the vicinity of Milwaukee, for building purposes, being rather compact and presenting a pretty smooth surface.

The basement story of a house in the town land of Lisbon shows the result of glacier movement in great perfection. The floor is perfectly polished, and the grooving in it very deeply marked, but far asunder. I have seen the surface of a limestone quarry in the town of Menomonee, adjoining the town land of Granville, well polished, with numerous parallel grooves, but slightly marked. Near the lighthouse, one mile north of the village of Sheboygan, the upper face of the limestone rock, which is near a hundred feet under the surface, is polished and ground, the direction of the grooves being W. N. W. and E. S. E. A short distance from the lighthouse, the limestone presents the same polished surface, and is streaked similar to the rock at that place, the direction of the streak being the same as above.

The water of Lake Superior occupies a depression not by any means "excavated out of the soft and yielding sandstone;" but caused by a depression of the earth, resulting from volcanic action. No mechanical action of water could excavate such an immense area to such a vast depth below the surface of the ocean, as the bottom of this wonderful expanse of water is known to be. To excavate it even a quarter of an inch below the surface of the ocean, would be a physical impossibility. Large quantities of gaseous matter having escaped from the regions now occupied by our great Lakes, a depression or falling down would necessarily take place, when the temperature became cooled. If this depression took place when those portions of this northern hemisphere, now occupied by the great lakes, were covered by the ocean, the lakes must have originally been salt water. A paper recently read before the Archeological Society of Ireland, points out the historical date of the formation of Lough Neagh and other lakes in Ireland, by volcanic action. If the moon had

seas and rivers, many of those deep volcanic caverns which have been rendered visible by Lord Rosse's telescope, would be lakes, whose bottoms would be far below the surrounding seas, as is the case with many of the American lakes. Numbers of these lunar caverns are known to be of great depth, the surrounding surface presenting no cone, but rather a flat plain, such as surrounds Lake Michigan and some of the other great lakes. These lunar caverns could no more be the result of the mechanical action of water, (allowing that this fluid did exist in the moon,) than that water could ascend from a lower point to a higher, unassisted by any force. I must, therefore, refer the excavation of such of our lakes, at least, as are below the ocean, not to the mechanical action of water, but rather to volcanic action. If Lakes Michigan and Huron were elevated by igneous action, the abrading action of water may have carried away large quantities of the surface, but none under the ocean; so that, in either case, a falling down of the bottom must have taken place to account for their present position.

Lake Superior is guarded on the east and north by an irregular belt of granite, which will arrest any further encroachments of the waters at these points. There are some limited patches of sandstone which have escaped the degrading action of the lake waters.

Lake Michigan, next in magnitude to Lake Superior, bounds Wisconsin on the east, and covers an area of 20,400 square miles; its greatest length being 320 miles, and greatest breadth 100 miles. The depth of Lake Superior is 900 feet, and its surface is 596 feet above the ocean, leaving its bottom 304 feet below the ocean. The depth of Lake Michigan is 1000 feet, and its surface is 578 feet above the sea; therefore the bottom of Lake Michigan is 422 feet below the ocean.

Lake Huron is 1000 feet deep, and its surface 578 above the ocean ; therefore its bottom is 422 feet below the surface of the ocean. This lake occupies an area of 20,400 square miles.

From what is here exhibited, it appears that Lakes Michigan and Huron are on the same level. Lake Erie is comparatively shallow, its mean depth being only 84 feet, and area 9,600 square miles, and its surface 565 feet above the sea. Ontario has a mean depth of 500 feet, and covers 6,300 square miles. Its surface is 232 feet above the sea. Lake St. Clair covers an area of 364 square miles, and is only 20 feet deep, its surface being 570 feet over the sea.

The area drained by these lakes is estimated at 335,515 square miles, all of which being a part of that immense plain bounded by the Appalachian chain of mountains on the east, and by the Rocky Mountains on the west, and extending north and south from the Arctic Sea to the Gulf of Mexico. The mean elevation of this immense region is less than 1000 feet, and its highest points nowhere exceed 2500 feet. These culminating points can scarcely be designated mountains, being only the more elevated portions of a gently rising and widely extended plateau. The two great outlets to carry off all the water of this vast district are the St. Lawrence and the Mississippi. The Mississippi is by far the larger, but the St. Lawrence discharges the greater quantity of water into the ocean. The St. Lawrence has stupendous cataracts—the other difficult rapids ; the "Father of Waters" is turbid—the water of the other preserves crystal purity. The St. Lawrence swells into inland seas—the other is destitute of such expansions, except Lake Pepin. Both, however, are similar in one particular, being the great highways of commerce, by which the vast regions through which they pass are enriched and supplied with the luxuries of other

It has been argued by many that these lakes have tides similar to those in the open seas; but now it is an admitted fact that there is no regular flow or ebb of the waters similar to what is observed on the sea shore. No doubt, the waters constantly lash the shore with a degree of force proportionate to existing causes; but the changes in the elevation are too variable to be traced to any natural cause constantly acting. I have taken some trouble myself to ascertain if the surface of Lake Michigan obeyed the attracting influence of the sun and moon, but on account of the limited area over which the attracting force of these bodies acts, I could observe no regular rise or fall of the surface, such as would result from the laws of gravity. The constant motion of the waters of these lakes may be traced to other causes of a local character. The variation in the surface of the lake may be due to unequal barometric pressures on its surface, at different points, at the same time, by which motion may be communicated, such as is generally seen on the margin of the lake. There are, however, times when the water is perfectly motionless, but not often for any length of time together. A local increased or diminished atmospheric pressure would lower or raise the water level, especially where the expanse of water is considerable. The water being thus locally raised, would, from its gravity, fall back, by which an oscillating motion would be communicated, which would continue for some time afrer the producing cause had ceased. In such a wide expanse of water as Lake Michigan, or Lake Superior, the surface must be constantly subject to unequal barometric pressure, by which the surface must be continually disturbed. The action of the wind will likewise set the water in motion, as is well known to every one occupying a low situation on the border of any of the lakes. A strong easterly wind will cause the waves to

rise some feet at all the piers along the western shore of Lake Michigan, inundatiug all such places as lie below a certain level. A westerly wind will produce similar effects on the eastern shore of the lake. De Le Bach very properly observes, that a sudden impulse given to particles of water, either by suddenly increased or diminished pressure of the atmosphere, would cause a rise or fall, in the manner of a wave, beyond the height or depth strictly due to mere weight itself. This would manifestly give rise to a series of aqueous waves, which would propagate themselves from the centre of disturbance, like the circles which are observed when a stone is thrown into the water. Hence it is that undulations are observed in the water before the gale sets in.

It is known that there is an annual variation in the surface of these lakes, arising from the melting of the ice and snow, which accumulate in their catchment basins during the inclement seasons of the year. When the water and snow freeze, the supply to the lakes diminishes, and therefore the surface falls ; but when these congealed masses begin to melt under the influence of returning heat, the surface of the lakes begins to rise. To this may be added the spring rains, which tend to elevate the lake surface in proportion to the quantity fallen.

Besides the annual rise of the lakes, which is but small, (being no more than from 12 to 18 inches,) a considerable one is known to recur at unequal intervals, varying from five to seven years, and, according to the report of persons who had opportunities of observing the phenomenon, to fourteen and nineteen years. During the last year, the surface of Lake Michigan attained a height of about four feet above its usual level, by which the lower parts of the city of Milwaukee were covered with water. A knowledge of this fact shows

the necessity of filling up such places, so as to raise them above the destructive influence of such recurring variations. Lake Superior has been known to rise six feet above its usual level. The cause of these variations in the surface of the lakes, at unequal intervals, is not so easily accounted for as the annual variation. One might be apt to refer the cause to the melting of immense glaciers, which might have taken years to accumulate in the bosom of some elevated regions in a high latitude ; but the geography of the country shows that no such regions exist, and no evidence is on record of the existence of such accumulations. Therefore we cannot refer these extraordinary accumulations of water in the lakes to extraordinary accumulations of snow. To what, then, are these periodical elevations of the surface of the lakes to be referred? Are we to refer the cause to increased rains falling in the catchment basins of the lakes at unequal intervals? No rain gauges having been kept in the Lake Superior region, the condition of all its tributaries previous to, and during the gradual elevations of the surface, can only be resorted to in the solution of the problem. Gentlemen connected with the copper mines of Lake Superior, informed me that during the years 1851 and 1852, the surface of the lake continued to rise day by day, while all the tributaries to it were lower than they had been seen for many years before. This information was corroborated by Mr. Sterling, of the State of Pennsylvania, a gentleman of great and correct observation, who travelled round the lake in 1852, when its surface was from four to six feet higher than usual, while he observed all its rivers and streams lower than usual, which proves that the increased elevation of the surface could, by no means, be due to an unusual quantity of rain falling in its catchment basin, previous to, and during the year in which the surface

was seen continually to rise; from which it appears that we must look to some other cause than that of rain for the solution of the problem.

In connection with this subject, I might mention that the Fox River, the principal tributary to Lake Michigan, contributed a less quantity of water than usual to that lake, in 1852, while the surface of the lake rose, during that year, from three to four feet higher than usual. Persons living on the bank of the Mississippi River assured me that that river was three feet lower during that year than usual.

From these facts the conclusion is irresistible—namely, that igneous action communicated an upward motion to the bottom of the lakes, which, of course, caused the water to rise while the upward movement continued. If we conceive this upward motion to cease, the surface of the lakes would soon begin to descend by discharging the elevated surface through the usual natural channel. When the upward force began again to act, so as to communicate motion, the same phenomenon must necessarily have taken place. And as there is no reason why this internal force should communicate motion at equal intervals of time, we cannot expect a recurrence of the above phenomenon at the end of equal periods. Our rivers show ample evidence of this up-heaving force; as they are all of considerable depth for some distance from the lakes; a condition that could not exist under any other circumstance than that of subterranean force, which would drive back the elevated waters, just as we see them at the different points where the rivers discharge themselves into the lake. These deep channels, now occupied by still water, must have been excavated by the mechanical action of water flowing from a higher to a lower point. Hence it appears that the water must have been forced back into these deep channels

by an upward motion communicated to the bottom of our lake; and as this phenomenon occurred once, without any doubt, there is no reason why it should not occur again and again, as often as similar circumstances may occur.

The following table, showing the quantity of rain and snow fallen at Milwaukee, in the years 1849, 1850, 1851 and 1852, proves conclusively, so far as that locality is concerned, that the great elevation of Lake Michigan in 1851 and 1852 could not have been the result of increased rains:

	1849.	1850.	1851.	1852.
January,	0.00	0.75	0.89	1.13
February,	0.00	0.33	2.51	1.00
March,	2.31	2.85	0.37	4.56
April,	3.24	2.24	1.47	2.64
May,	4.08	0.28	6.85	1.95
June,	3.73	1.98	4.43	2.46
July,	2.36	1.99	3.37	3.27
August,	3.54	9.03	3.15	0.58
September,	1.25	1.73	2.92	2.30
October,	3.07	1.00	1.32	4.87
November,	5.00	2.80	2.08	2.72
December,	0.94	1.43	1.04	1.85
Total inches,	29.49	26.41	33.40	29.33

It may be seen by this table, that more rain fell during ten months of the year 1849, than during the whole year of 1850; yet the lake was higher in 1850 than in 1849; and, comparing the quantity fallen during ten months of 1849 with that which fell in 1852, we see that the former exceeded the latter, though the surface of Lake Michigan was higher in '52 than in '49, by three or four feet.

I was told that Lake Huron was higher in 1852 than usual, but got no reliable information in reference to the state of its tributaries in that year.

Green Bay, a name derived from the fancied color of the water, may be considered as a part of Lake Michigan, being the outlet of the Fox or Neenah River. At this point there are several islands, the largest being Potawotomie Island. The bay contains, besides this, Rock Island, Detroit and Plum Islands, Chamber Island, and Grass Island.

The largest lake in the State is Lake Winnebago, being about thirty miles long and ten broad, and containing an area of about two hundred and twenty square miles. The Fox, or Neenah River, enters it at Oshkosh, and issues from it by two channels ; the south channel leading to the town of Neenah, and the north to Menasha, enclosing Doty Island between both branches. These two rival towns have grown with magic speed within a few years, and are destined, at least one of them, to rise to some importance ; occupying, as they do, the high way between the great lakes and the Mississippi. These channels, connecting Lake Winnebago with the little Butte des Mortes lake, are known as the Winnebago Rapids, which are now navigable by steam-boats. When I first went to lay out the canal at the Neenah side, only one boat was employed on the lake, and now there are no less than , being an increase of in about three years ; and if the improvements down from these points to Green Bay, and west to the Mississippi, were completed, which it is expected they will be within a year or two, I have no doubt but scores of steamboats will be seen daily on this fine sheet of water. In calm weather, the water of this lake is quite clear ; but during a heavy gale it becomes turbid, the lake being shallow, but sufficiently deep for purposes of navi-

gation. This lake must have been deeper than at present. For about the distance of eight miles, the north shore of Lake Winnebago is composed of a low sandy beach, and for an extent of fifteen miles, the east side of the shore presents a wall composed of rocks, so closely laid together as to lead one to suppose that the work was constructed by man. A similar wall, but of less continuity, skirts portions of the western shore. These walls rise about five feet above the water, and extend under it some hundreds of feet. These walls have been caused by the expansive force of ice in winter, by which the rocks near the shore are annually driven towards it, until they are finally thrown up into a ridge, or wall; a phenomenon observable in Pewaukee, and other lakes in Milwaukee County. The surface of this lake, according to Captain Cram, is 160 feet above the level of Lake Michigan.

All these vast lakes discharge themselves through the river St. Lawrence; but time has left upon record ample evidence that Lake Michigan once sent its waters down the valley of the Illinois, into the Father of Waters. Lakes Huron and Erie were then tributaries to Lake Michigan. I have traced the old track through Illinois, and, if space and time permitted, I should feel much pleasure in describing the evidences left behind by the deserted river. It is supposed that a barrier once existed across the straits of Mackinaw, through which the waters of Lake Michigan now flow into Lake Huron. This change of direction in the course of these immense bodies of water may be accounted for on the principle of elevation and depression. The bottom of Lake Michigan must have once occupied, relatively to its western shores, a lower position than it does at present, as before stated. All the streams I have seen discharging themselves into this lake, are, for some distance inland, very deep, affording basins for

the accommodation of shipping at Chicago, Southport, Racine, Milwaukee, Port Washington, Sheboygan, Manitowoc, &c.

Ancient lake beeches are traced round Lake Erie, elevated one hundred and eight feet above the present surface of the water, which is sufficient evidence that a depression must have taken place at that point. Now, a depression of the country about the Niagara River, and an elevation of the northern part of Illinois, would evidently change the course of the lake waters from the Mississippi to the St. Lawrence, as we find them at present. Every geologist is aware that great changes in the relative elevations of several districts have taken place, and that the causes which produced such changes are still in operation in many parts of the world. The earth is rising in Scandanavia at the rate of two feet in a century, and I have no doubt but that Lake Michigan is rising, not, perhaps, by an equible motion, from a similar cause.

The absence of islands in Lake Michigan, except a few near its northern extremity, is unfavorable to navigation, as there is scarcely anything deserving the name of a deep bay on the entire coast, except at Green Bay, before noticed. There are circumstances, however, which, in some degree, compensate for the absence of deep bays or islands along the western shores of Lake Michigan. Not a single shoal or rock is to be found, the entire coast being lined with a bank of clay, and the margin sufficiently deep for vessels drawing any depth of water, with these deep and safe inlets at the mouths of the streams, before mentioned. It is very remarkable that all these great lakes are characterized by the absence of islands.

Hitherto these Western States have been hemmed in for about five months in the year by the ice and snow. The navigation of Lake Michigan usually opens in the month of

March, but we seldom have arrivals from below the straits of Mackinaw till some time in April, in consequence of these straits remaining closed with masses of solid ice until about this time. In future, I see no reason why we should continue separated from the eastern States even for one month. The Rail Roads proposed to be built along the shore, from Green Bay to Chicago, and from Grand Haven, opposite Milwaukee, to Detroit, and by Port Huron, to Halifax, will enable the Wisconsin merchant, and others, to go to New York or Boston, or to any other place where their business may require them to go. The navigation across the lake, from Milwaukee to Grand Haven, may not be interrupted for three days together during a whole year ; but should it become interrupted, the difficulty will be obviated by going through Chicago. The use of an ice-breaker would enable a first class steamboat to cross the lake during the entire winter, during high gales excepted. A break-water outside, and a good dock at or near the confluence of the Milwaukee and Menomonee rivers, with a straight cut to the lake, would advance the interests of the city of Milwaukee very considerably. These are improvements which the necessities of the State imperatively demand speedily to be carried into effect.

The shipping business on these lakes is almost incredible, when we consider the few years that have elapsed since the first steamboat made its appearance on their surface, which was in the year 1819, when the Walk-in-the-Water made two or three trips to Lake Huron. It was not, however, till the year 1826 that the silvery waters of Lake Michigan were first ploughed by the keel of a steamboat—a pleasure trip, from Buffalo to Green Bay, having been made in the summer of this year. In 1832, the first steamboat greeted the city of Chicago with a snort, and in 1838 nearly the entire trade of

the upper lakes, Erie, Huron, and Michigan, was carried on by eleven small steamers. But in 1845, there were upon the upper lakes sixty vessels, including propellers, moved by steam, and three hundred and twenty sailing vessels; the former measuring twenty thousand tons, in the aggregate, and some of the latter carrying one thousand tons each. In 1846, according to official statements exhibiting the consolidated returns of both exports and imports, the monied value of the commerce of the harbors of Erie was $49,145,750. At present, it is supposed that the commerce of lakes Erie and Michigan amounts to over $76,-000,000.

The following steamers and the routes they are intended to occupy during the season of 1852, will give some idea of the commercial business of the lakes:

Chicago and Buffalo line—the Lady Elgin, Sultana, Hudson, Globe, America, and Wisconsin. The Minnesota and Iowa will make eighteen trips between Buffalo and Chicago, carrying freight and passengers.

Chicago and Milwaukee line—in connection with the Michigan Central and Southern Rail Road lines: the Arctic and Pacific. The Sam Ward will run to Chicago and New Buffalo until the completion of the Central road to that city.

Chicago and Grand River line—the Telegraph.

Buffalo and Green Bay line—the Michigan and J. D. Morton.

Buffalo and Detroit line—in connection with the Michigan Central Rail Road: the May Flower, Ocean and Atlantic.

Buffalo and Toledo line—the Albany, Troy, Ohio, Superior, Louisiana, Baltic, and Diamond.

Buffalo and Cleveland line—in connection with the Cleveland, Columbus and Cincinnati Rail Road: the Empire State and Buckeye State.

Dunkirk and Detroit line—the Queen City and Alabama.
Cleveland and Detroit line—the Forest City and Cleveland.
Sandusky and Detroit line—the Arrow.

Wisconsin owns (1852) in vessels trading from her own ports, 6,526 tons burthen, and employs 325 seamen. She exported in 1851, by way of Lake Michigan, the value of $2,381,070. The total amount of value entrusted to the different western lakes during 1851, is, to—

Champlain,	$17,740,108	Ontario,	$31,470,349
Erie,	127,381,432	St. Clair,	722,900
Huron,	1,420,210	Superior,	4,111,317
Michigan,	82,361,314		

The lumber business of Milwaukee, in imports, partly from Michigan and partly Wisconsin, is as follows, viz:

	1850.	1851.	1852.	1853.
Boards, ft.,	30,160,970	30,103,092	12,649,426	15,000,000
Timber,	11,214,182	15,782,043		
Laths,	2,342,000	7,481,413		5,300,000
Planks,	10,918,207	17,182,318		
Shingles,	1,700,400	15,180,750	6,820,000	9,000,000

Wisconsin exported in 1851, by way of Lake Michigan the value of $2,381,070.

Property to the amount of $730,537 was lost on the western lakes, in 1851, and 79 lives. And five steamers, three propellers, and thirty-seven sailing vessels were totally lost during the last four years, besides property to the amount of $2,678,146, and 568 lives. In 1852 the loss of property was $260,000 greater than in any previous year, being $3,235,701, as prepared by Capt. Rounds. There occurred in all, two hundred and twenty-nine disasters; of which seven occurred in the month of April, nineteen in May, twenty-four in June, fifteen in July, sixteen in August, twenty-one in

September, twenty-seven in October, eighty-five in November, and fifteen in December. Six steamers, seven propellers, and thirty-five sailing vessels have gone out of existence altogether. Capt. Jones observes that, regarding the loss of life by the steamer Atlantic, there are various opinions; her agents and proprietors contending it not to exceed one hundred and fifty, while many who were familiar with the circumstances, set it as high as three hundred, and some even higher.

The fearful amount of the loss of life on our American lakes and rivers, arising, without any doubt, from wilful neglect on the part of those in command of our steamers; calls in the most earnest terms for some legislative enactments sufficiently strong to arrest an evil which has caused fearful ravages, for some years back, on the lakes and rivers. Every one who places any value upon human life, must be horror-struck with the inhuman conduct of steamboat commanders, who sacrifice hundreds of valuable lives by the practice of running races with rival boats. No punishment is too severe for such inhuman conduct. The number of lives lost within the present year (1852) is so appalling that Congress cannot permit the session to pass away without passing a law to protect life and property committed to the care of captains in command of our lake and river steamers. It is, however, but justice to say that those who have proved themselves reckless of human life, are the exception—not the rule. I have known several eareful, polite and attentive gentlemen in command of many of our steamboats. My observation cannot, of course, apply to them. They are governed by the laws of duty and humanity. I am bound to bear testimony to the polite attention and great caution of the gentlemen connected with the navigation of Lake Michigan. In no instance have

they neglected their duty, so far as I had any opportunity of judging.

The number of steamboat accidents during the past year, (1853), has been but few, compared with preceding years, which is no doubt mainly due to the working of the new steamboat law. The following is a table of steamboat accidents:

	Accidents.	Killed.	Wounded.
January,	4	26	38
February,	1	120	17
March,	3	30	21
April,	3	58	—
May,	none	—	17
June,	4	19	2
July,	1	7	5
August,	2	2	14
September,	3	3	23
October,	4	18	10
November,	3	18	16
December,	3	13	—
	31	314	183

The quantity of fish caught in these lakes is really astonishing—the white fish being by far the best. Sturgeon of large size are caught in Lake Michigan; and, among other fish found in many of our lakes and rivers, are salmon, perch, bass, suckers, herrings, pickerel, trout, cat-fish, sheep's-head, lawyers, and many others. Large quantities of the fish are used in all the populous towns in the State, and in some places in the northern parts of the State, where agriculture has not made much progress; and where game is scarce, the Indians have lived almost exclusively on it. The salmon, or trout, is not as good a quality as those caught in Great Brit-

ain or Ireland. The exact quantity of fish taken in our lakes is not easily ascertained, as no one takes the trouble to collect the statistics of this important branch of our resources.

Besides Lakes Superior, Michigan, and Winnebago, our State is profusely dotted with many others of less note, in point of magnitude; several of them exhibiting the grandest scenery that can be imagined. Skirting many of these deep and crystal reservoirs, are sloping hills, covered with groves and clumps of stately trees, precipitous bluffs covered with cedar, hemlock, spruce, and other evergreens; projecting rocks, (whose bases have been worn away by the corroding hand of time,) on which the American eagle stands, with all the pride of majesty, inspired by the consciousness of his power and superiority over the rest of the feathered tribes of the forest, eagerly watching the ingress and egress of such animals as may have taken refuge in the gloomy cavern beneath, and ready to pounce upon them with relentless rapacity. The thousands of small wooded islands confer on the Lake of the Woods and Rainy Lake a degree of picturesque character peculiarly interesting.

Particular description of scenery forms no part of my design, otherwise many of the smaller lakes of Wisconsin would deserve special notice. Among them are Cass Lake, Lake Pepin, St. Croix, (Upper and Lower), the Four Lakes, the Mille Lac, Ottowa, Geneva, Green, Little Green, Pewaukee, Pewaugan, Koshkonong, Sand Lake, Leech Lake, Nagoweeka Lake, Nemahbin Lake, Crooked Lake, Cranberry Lake, Silver Lake, La Belle Lake, Oconomowoc Lake, Lac Traverse, Itasca Lake, Front Lake, Lac Brule, Lake Katakettlekon, Little or Lac Vieux Deserte, Sturgeon Lake, Lac de Flambeau, or Torch Lake, Otter Lake, Lake Puckawà, Buffalo Lake, Lake Showano, English Lake, Cedar Lake,

Bear Lake, Big Elkhart Lake, Little Elkhart Lake, Sheboygan Lake, Musquewoc Lake, Random Lake, Gold Lake, Kauchee Lake, Beaver Lake, Mequonago Lake, Mouse Lake, Monish Lake, Muskego Lake, Nagowick Lake, Nashota (Twin) Lakes, North Lake, Pine Lake, Round Lake, Powock Lake, Tuck-kip-ping Lake, Delavan Lake, Como Lake, Deer Lake, Rock Lake, Ripley Lake, Red Cedar Lake, Fox Lake, Lake Emily, Lakie, Long Lake, Rush Lake, Great Butte des Mortes, Little Butte des Mortes, Swan Lake, Mud Lake, Lake Sarah, Lac Courtsielle, Lac Chetac, Tamarack Lake, Rice Lake, Yellow Lake, Lake Pokegoma, Portage Lake, White Elk Lake, Puckwee Lake, or Flag Lake, Island Lake, Pekegomag Lake, Big Turtle Luke, Little Turtle Lake, Kewaykevede, Little Lake, Swamp Lake, Lake Wepelanock, Lower Rock Lake, Upper Rock Lake, Muscle Lake, Qui Traine Lake, Lilly Lake, Sheshebagomag Lake, Mishun Lake, La Roche Lake, Winibigoshish Lake, Lac Grit, Hornangle Lake, Pejekig Lake. Besides these, Wisconsin contains numerous lakes which have not yet received names. The lakes are here mentioned without any regard to order or locality. Those wishing to know the localities of the minor lakes here mentioned, may consult Mr. Lapham's work on Wisconsin.

The lakes in the north and west parts of the State of Wisconsin may be divided into two classes, or, rather, varieties. From these lakes, many of the streams take their rise. One class, or variety, forms a chain, connected by streams, sometimes so shallow as scarcely to admit the passage of a light canoe, while in other instances they are formed by the expansion of the waters of larger streams in basins of one or two miles in diameter. To this variety belong the lakes which have no communication except in the spring of the

year, during the melting of the snow, or in rainy seasons, "when they are joined by streams which flow along vallies, once evidently the beds of large water courses, but now elevated above the general level of the lakes, and converted into meadows, cranberry marshes, or swamps." Mr. Norwood further observes, that between a great portion of the now isolated lakes west of Bois Bruel and St. Croix River, from St. Louis River to the Falls of St. Anthony, old communications of this kind may be traced, and most of the rich vallies of that portion of the district owe their soils to lacustrine deposites, made during the long period of elevation, during which the beds of large rivers were first converted into chains of lakes, and subsequently drained, as the process of elevation continued."

Many of the vallies west of the Bois Brule, and south of the great bend of the St. Louis River, present indications of having been drained at a comparatively recent period, while some of them are evidently in process of drainage at the present time; so that we may safely calculate on a considerable addition to the tillage land of the State in the course of time. This process of drainage might be accelerated by art, at a very inconsiderable expense. In connection with this process of drainage, I take leave to state that Dr. Owen says that the Little Makoquito, (a stream barely large enough to turn a mill,) has, by abrading its channel for countless ages, worn its bed to the depth of four hundred feet in solid limestone, and that the mighty Mississippi has rolled its tide long enough to have worn the chasm through which it passes.

Before I conclude the subject connected with these two classes of lakes, I might mention, as being rather curious, that several of them are situated at the summit of the watershed, and are tributary both to Lake Superior, and the Mississippi.

The second variety of lakes are such as have no visible outlet, or any visible source of supply except what collects from the surrounding hills. These are perhaps more numerous than the chain variety, before described. These lakes, which seldom exceed one mile in diameter, are generally found in districts based upon sandstone, or where heavy deposites of drift are found resting on metamorphic rocks. These lakes are generally circular or oval, while the chain lakes present every variety of form. These circular or oval lakes are generally from 60 to 100 feet under the surrounding surface, "the ground sloping down to the water's edge with great regularity, like the descent of an amphitheatre, and covered with grass." Many of these lakes are dotted with islands, based on boulders, and covered with wood. These are seldom of any considerable depth, and are supplied, as well as the chain lakes, with delicious fish. These lakes show unmistakeable evidence of being extinct volcanoes. The borders of some of the chain lakes are covered with marsh, in which the wild rice grows in great plenty, which invites myriads of wild fowl to flock together in this region of country. The beds of almost all are pebbly, and the water clear.

With so many lakes and rivers, what country is better supplied with fish and fowl? With such a vast extent of navigable waters, what country can equal it in facilities of transport? The Mississippi alone, with its tributaries, affords continuous navigation for 14,500 miles. On this river are 600 steamers, making a tonnage of 150,000, worth $16,000,-000, and carrying $250,000,000 yearly. When all the Rail Roads chartered, at present amounting to 53, shall have been completed, all the tributaries to this river made navigable,

what calculation will represent the sum total of the business done on it? Time alone can tell. The Mississippi, with all its outlets, measures 51,000 miles, and some writers are of opinion that 20,000 miles are navigable, which exceeds the above estimate.

CHAPTER IX.

Equal, if not many degrees superior, in importance to our water carriage, will be our rail roads, when completed. An inspection of the map of Wisconsin will show, that when the roads now in progress, and those for which charters have been obtained, shall have been in travelling order, no State in the Union can compete with this, as regards facilities of internal intercourse. All we want in Wisconsin is unanimity. By co-operating in carrying out all such improvements as are calculated to benefit the State generally, and discountenancing wild schemes, serving no other purpose than to impose on the public and benefit the concoctors of such schemes, this State will keep pace, perhaps, with any in the Union.

The following list of rail roads, already chartered, will show that Wisconsin will soon afford facilities for travelling not surpassed by any of the Western States :

Milwaukee and Mississippi;* Green Bay, Milwaukee and Chicago;* Rock River Valley;* Sheboygan and Mississippi;* Watertown and Berlin, Beloit and Madison;* Michigan and Wisconsin Transit; Kenosha and Beloit;* Wisconsin Cen-

tral; Mineral Point ;* Green Bay and Minnesota ; Watertown and Madison ; Green Bay, Depere and Madison ; Racine, Janesville and Mississippi ;* Southern Wisconsin ;* Fox River Valley ; Milwaukee, Waukesha, Jefferson and Madison ; Western Wisconsin and Mining ; Manitowoc and Mississippi ;* Berlin and Lake Superior; Columbus, Montello and Stevens' Point ; Milwaukee, Fond du Lac and Green Bay ; La Crosse and Portage City ; Winnebago, Racine and Portage City ; Port Washington and Lake Winnebago; Omro and Waupun ; Oshkosh and Lake Superior ; Oshkosh and Portage City ; Janesville, Fulton and Beloit ; Fort Howard and Lake Winnebago ; Madison and Prairie du Chien ;* Madison, Sauk and Mississippi ; Milwaukee and Fond du Lac;*‡ La Crosse and Milwaukee ;* Milwaukee and La Crosse ;* Milwaukee and Horicon ;* Milwaukee and Watertown ;* Kenosha and Beloit ;* Potosi and Dodgeville ;* Shullsburg Branch ;* Madison and Kenosha ;* Madison and Swan Lake;* Fort Winnebago, Baraboo Valley and Madison ;* Delavan ;* Cascade and Lake Michigan ;* Fond du Lac and Madison ;* Green Bay and Lake Superior ;* Madison, Fort Atkinson and Whitewater ;* Portage City, Stevens' Point and Whitewater ;* Portage City, Stevens' Point and Wausau ;* North-western. *)

The farmer of Wisconsin, like the merchant, makes his money, not of what he consumes, but of what he sells ; and as his profits depend considerably on the facility of transporting his produce to the market, and the cost of doing so, it follows that nothing should be left undone, either on the part of government or the people, to open up and extend the chan-

* The roads marked with an * were chartered prior to 1853, and many of them were granted extensions and branches at that session ; *† consolidated in 1853 with the Milwaukee and Mississippi: *‡ consolidated in 1853 with the Milwaukee, Fond du Lac and Green Bay
The foregoing list has been taken from the Milwaukee *Sentinel*.

nels of transmission, by which the farmer's interest will be promoted, trade and commerce extended, the merchant's gain increased, and every class through which the produce passes, including the consumer, benefited. Where industry prevails, its moral, as well as its physical effect, soon manifests itself. Employment provides competence, creates a desire to save, and diminishes a desire for profligacy, dissipation, and feuds, political and religious. While the construction of rail roads and other avenues of communication afford present employment, they become the source of wealth to thousands, securing, when completed, to the working population increased employment, by thus extending the field of industry, and laying the surest foundation on which to build the future prosperity and happiness of the State. The mineral treasures now lying useless in many parts of the State will become accessible, and its agricultural capabilities fully developed.

The Milwaukee and Mississippi Rail Road must command a vast amount of business, passing, as it does, through a densely populated agricultural country, and numerous villages, among them the flourishing towns of Janesville, and Madison, the capital of the State. The road will soon be finished to Madison, and will be pushed through to Prairie du Chien, on the Mississippi, as fast as circumstances will allow. What this road is destined to do, is not a matter of conjecture or prophecy. What it has already done is a sufficient guarantee for what it will do when completed. Its earnings in 1853, amounted to $221,455, 62, which left the shareholders a dividend of 10 per cent. on the capital invested, giving confident hope of becoming one of the best paying roads on this continent. This road will command a portion of the mineral trade.

The La Crosse Rail Road will open up a vast field of enterprise and industrial labor, passing, as it will, through re-

gions rich in mineral wealth, luxuriant in soil, and abundant in timber, which cannot fail to induce miners, farmers and lumbermen to locate along its route. The proximity of the Iron Ridge to the rising city of Milwaukee must soon ensure the outlay of capital to convert this inexhaustible mountain of iron ore into countless wealth, giving employment to thousands, and spreading the blessings of home manufacture among all classes of our people. Instead of sending our capital to other States to purchase stoves and other articles of domestic use, we shall manufacture our own, and be able to undersell them in their own market. Furnaces amply supplied with fuel, found on the spot, will soon preclude the necessity of sending millions from the States to England every year to purchase what this mountain can supply in quantities inexhaustible. The Baraboo district, and others not far distant from this road, show unmistakeable evidence of lead and other ores, which capital and industrial skill must soon convert to their ultimate uses.

And, while this road is destined to spread blessings innumerable along its course, it will, in turn, receive its reward, by becoming the channel through which the vast treasures it will render accessible, and all the business it will create, must find an outlet. While it will necessarily draw its natural share of business from all the places flanking it on the south, districts covering many thousands of square miles to the north, must, of necessity, become tributaries to it. Tracing on the map the direct route from the east to Grand Haven, and thence across to Milwaukee, the La Crosse road must become the highway (of European and Eastern travel) to Minnesota, the northern parts of Iowa, and all the north-west of Wisconsin, giving it a tributary business area, which, in

time, when the country fills up, must make it one of the best paying roads in America.

The Lake Shore road must at all times command a large passenger business, as is proved by the vast number that passed to and from Milwaukee and Chicago during the years 1852 and 1853. I took considerable pains to ascertain this by all the routes; namely, by boat, stage, and rail road, via Janesville, which last was but small; and the result of my inquiry was, that in 1852, 23,005 came to Milwaukee, and 11,483 left it; and in 1853, 27,540 persons came, and 14,323 left—making the travel to and from Milwaukee in 1852, 34,488, and in 1853, 41,863. In addition to this number, 7,200 persons landed at Kenosha in '53, 13,400 at Sheboygan and Port Washington, and 11,328 at Green Bay, Twin Rivers and Manitowoc. One of the Emigration agents for Wisconsin states in his report, that "the number arrived in our State in 1853, amounts to 79,413," which I consider too high a number. However, what I have stated above, which is the result of personal examination, is sufficient to show that the Lake Shore road has a fair chance of a large share of business, at least in the transmission of passengers.

The Milwaukee and Horicon Rail Road, passing through Waupun, Ripon and Berlin, on the Fox River, will, when extended into the pinery, prove a valuable acquisition to a vast extent of country, the resources of which it will speedily develope.

The Milwaukee and Watertown Rail Road will open up a good country, and raise that thriving town (Watertown) to some importance.

The Rock River Valley Rail Road, which runs south-west from Fond du Lac, at the head of Lake Winnebago, through Janesville, Woodstock, and Big Foot Prairie, to Chicago, has

been all located, and part of it graded and finished. The projectors of this road had it in view to cut off the western trade from Milwaukee. This attempt, however, will be frustrated by the different roads, which will tap it at different points.

Milwaukee and Fond du Lac will have a rail road communication, which will prove mutually beneficial. By this and the route to Green Bay and Oshkosh, strangers in quest of land can reach those points from Milwaukee in a few hours, where there is still much good land to be disposed of. These two roads will be of incalculable benefit to all the towns and villages yearly starting into existence in the northern parts of the State, as their inhabitants can come at all seasons to Milwaukee, which, from its present importance and position, must continue to be the great emporium from which all these places must be supplied with merchandize.

Sheboygan and Fond du Lac will be connected by a rail road, otherwise the former port, which has been recently improved, would be entirely cut off from business.

Manitowoc must be up and stirring, or else her legitimate business will pass by.

Racine and Kenosha are securing business by a railway connection with the country west of them, in addition to the advantages conferred by the Lake Shore road.

The mining districts in the south will advance in value by the introduction of rail roads, by which to send off the mineral treasures to market. The rising village of Beloit has already secured the advantages of a rail road.

The absence of lofty hills and deep ravines, requiring cutting or tunnelling, and expensive filling or viaducts, with a superabundance of wood for little or nothing, keeps down the expense of actual construction in this country, as compared

with the enormous cost of construction in England or Ireland, where labor is so low. The great item of expense in America is iron, which, in general, is imported from Great Britain. This is unpardonable in a country full of the finest iron ore in the world, with abundance of fuel to fashion it into any shape that may be required. When shall we see the folly of sending so many millions of dollars to England every year to purchase railway iron when it can be manufactured here to the highest perfection? And instead of getting a good article from England, she sends us the very dregs of her manufacture. Last year, we imported of rail road iron to the amount of more than $8,000,00. Here it costs nothing to procure a charter for a rail road—in England or Ireland it sometimes costs $10,000 a mile; here it costs little to obtain the right of way—in the old country it sometimes costs thousands; in this country the engineering expense is but a trifle—in the old country it forms a most important item in the expense. In this country, the first outlay is kept as low as possible, consistent with the bare working capacity of the road. In Wisconsin it will not often exceed $20,000 per mile. When a rail road here earns the means of improving itself, the improvement is effected—in the old country, the road is constructed in the first instance at a vast expense, but is to last for ever. Most of the roads here have only single tracks, to save expense. In a new country, such as this, without much capital, the plan we adopt is the wiser of the two, and as economy is our guide, why send so much capital abroad when we have the means of supplying ourselves at our doors. We could supply the whole world with lead, yet we import of that article to the amount of one million and a half of dollars.

Rail Road Accidents.

In connection with this subject, I might mention a few of the chief causes that have led to the loss of life and property on our rail roads. In the first place, the want of proper fences gives free access to cattle, hogs, and other animals, by which life and property are at all times exposed to accidents, and frequently sacrificed. It is true that when a road runs through a wilderness, far removed from the habitation of man, there is little danger to be apprehended, and the expense of fencing may be considerable. But though there may be an excuse for neglecting to fence such a road, there can be none whatever for leaving a road, in the vicinity of a town, or even of a locality but thinly inhabited, exposed to the intrusion of man or beast; as such exposure endangers the life, not only of the passengers, but of the intruders themselves. Dangers arising from this cause ought to be strictly guarded against, by erecting proper fences. In the second place, the use of flat iron rails has been the frequent cause of fatal accidents; and even rails of the best form, when not properly fixed and of sufficient weight and strength, have been often the cause of sad disasters, which a weightier article, firmly fixed, would have prevented. In the third place, when the railroad crosses a public or private road, on the same level, danger is to be apprehended. In the old country, no accident can arise from this cause, as in all populous districts the roads are never allowed to cross each other on the same level, and whenever they do, in rural districts, the crossing is well guarded, so as to prevent the possibility of a collision.

Another cause, which has frequently led to accidents, is the unpardonable neglect of a minute and thorough examination, by a competent person, of the working condition of the boiler, the engine, and the working apparatus of the entire train

before starting. This is a duty that should be strictly attended to. But in too many cases, the cause is traced to a palpable neglect of the persons in charge of the engine, arising often from the pernicious use of intoxicating liquors. Neglect on the part of the engineer, arising from whatever cause it may, should never be overlooked. Want of due caution on the part of the engineer, in approaching a stopping-place, has frequently been the cause of violent and destructive concussions, which might have been prevented by timely attention to the regulation of the necessary speed. Curves of small radii have contributed their proper share to the catalogue of accidents of which we so often read.

Accidents sometimes occur from a neglect on the part of the attendant, in arranging the switch so as to allow the train to pass from one track to another. Curves on rail roads should never, if possible, be so abrupt as to require the train to pass over them with any considerable diminution of speed. And, as a further precaution, both the curved part and the approaches to it should be comparatively high. A curve of a quarter of a mile radius is passed with safety at the rate of thirty miles an hour. I might point out several precautionary measures never thought of in this country, which, if carried out with the same scrupulous regard to public safety as in England, could not fail of saving many valuable lives that are now daily exposed to danger under the careless management of engineers and others having charge of the working departments of our road. The following comparative statement of the railway accidents, for one year, in the State of New York and England, will show, at once, how much better railway business is managed there than here :

Out of 47,509,392 passengers, conveyed on rail roads in England, only 17 were killed ; while out of 7,410,653 pas-

sengers carried on the New York rail roads, 162 were killed. In England, the chances of being killed on a rail roadwere as 1 to 285,017; while, in the United States, the chances were as 1 to 45,744, thus showing that the chances of being killed in the State of New York are between 6 and 7 times as great as in England. When things are so in the State of New York, where we have some of the best roads in the Union, what must the comparative danger be on other roads, not near so well equipped? This is a subject demanding the most earnest and speedy attention of the Legislature at Washington.

Very few are aware of the wonderful force with which two locomotives, moving in opposite directions, come together, if we suppose a special train to move at the rate of 60 miles an hour, the common speed on some of the English and American rail roads. This is one mile in a minute, or 88 feet in a second. Now, if we suppose the entire train to weigh 35 tons, which are equal to 70,000 pounds, and which, moving at the rate of 88 feet per second, gives a momentum of 6,160,000 pounds, moving at the rate of one foot per second; and when two such locomotives meet, moving in opposite directions, the momentum will be twice as great, that is, 12,320,000 pounds, moving at the rate of one foot per second of time. The crash occasioned by such a collision will just be equal to that produced by 611 cannon balls, each 18 lbs., shot from a great gun, charged with the usual quantity of gun-powder. If we suppose the velocity to be only 30 miles an hour, which is not considered a high speed, and the train to weigh 70 tons, the effect produced by a collision with another of equal weight would exactly be equal to the last. A collision of two, weighing 140 tons each, and moving at the rate of 15 miles an hour, would be equally disastrous, the momentum in each case being the same.

Doctor Lardner adopts a most ingenious illustration to render familiar the extraordinary velocity with which our express trains move: "The Great Western Express, to Exeter, England, travels at the rate of 43 miles an hour, including stoppages, or 51 miles an hour, without including stoppages. To attain this rate, a speed of 60 miles an hour is adopted midway between some of the stations, and, in some of the experimental trips, 70 miles an hour is about equivalent to about 35 yards per second, or 35 yards between two beats of a common clock. All objects near the eye of a passenger travelling at this rate, will pass by his eye in the thirty-fifth part of a second; and if 35 stakes were erected at the side of the road, a yard asunder, they would not be distinguishable one from another; if painted red, they would appear collectively as a continuous flash of red color. If two trains with this speed passed each other, the relative velocity would be 70 yards per second. If one of the trains were 70 yards long, it would flash by in one second. Supposing the locomotive which draws the train to have driving wheels 7 feet in diameter, these wheels will revolve 5 times in a second; the piston moves along the cylinder 10 times in a second; the valve moves and the steam escapes 10 times in a second—but as there are two cylinders, which act alternately, there are really twenty puffs, or escapes, of steam in a second. The locomotive can be heard to cough, when revolving slowly, the cough being occasioned by the abrupt emission of waste steam up the chimney; but twenty coughs cannot be separated by the ear, their individuality becoming lost. Such a locomotive speed is equal nearly to one-fourth of that of a cannon-ball, and the momentum of a whole train, moving at such speed, would be nearly equivalent to the aggregate force of a number of cannon-balls equal to one-fourth

the weight of the train. That a smash should follow a collision, is no subject of marvel, if such a train, moving at such speed—or anything like such speed—should meet with any obstacle to its progress."

Notwithstanding that several accidents happen on railroads, occasioned by negligence, and other causes over which no one has control, yet an inspection of the foregoing accidents in England and this country, will satisfy any one doubtful on the subject, that less accidents happen by this mode of travelling than by any other whatever. Single tracks, to spare expense, is a source of numerous accidents.

Rail Roads will supercede all other means of transit, where speed and a saving of time are required. The following tables will show how far the farmer can afford to carry his produce to market on wheels, and how much cheaper he can travel by rail, the difference being real profit. The table shows the comparative value of a ton of wheat and one of corn at given distances from market, as affected by the cost of transportation, by rail road, and over the ordinary roads of the country :—

Miles	Rail Road.		Ordinary Highway.	
at market.	Wheat.	Corn.	Wheat.	Corn.
10	$49 50	$24 75	$49 50	$24 75
20	49 25	24 60	48 00	23 26
30	49 20	24 45	46 50	21 75
40	49 00	24 15	43 50	18 75
50	48 75	24 00	42 00	17 25
60	48 50	23 85	40 50	15 75
70	48 45	23 70	39 00	14 25
80	48 30	23 55	37 50	12 75
90	48 15	23 40	35 00	11 25
100	48 00	23 25	34 50	9 75

Miles at market.	Rail Road. Wheat.	Rail Road. Corn.	Ordinary Highway. Wheat.	Ordinary Highway. Corn.
110	$47 85	$23 00	$33 00	$8 27
120	47 70	22 95	31 50	6 55
130	47 55	22 80	30 00	5 25
140	47 40	22 65	28 00	3 75
150	47 25	22 50	27 00	2 25
160	47 10	22 35	25 50	0 75
170	46 95	22 10	24 00	0 00
180	46 80	22 05	22 50	0 00
190	46 65	21 90	22 00	0 00
200	46 50	21 75	19 50	0 00
210	46 35	21 60	18 00	0 00
220	46 20	21 45	16 50	0 00
230	46 05	21 30	15 00	0 00
240	45 90	21 16	13 50	0 00
250	45 75	21 00	12 00	0 00
260	45 60	20 85	10 40	0 00
270	45 45	20 70	9 00	0 00
280	45 30	20 65	7 50	0 00
290	45 15	20 40	6 00	0 00
300	45 00	20 25	4 50	0 00
310	44 85	20 10	3 00	0 00
320	44 70	19 95	1 50	0 00
330	45 55	18 80	0 00	0 00

It may be seen from these tables, that, at the distance of 170 miles from market, the cost of hauling a ton of corn that distance by the common roads equals the price it will fetch, leaving the farmer nothing, while it will leave him $22 10 when brought to market the same distance by rail road. A ton of wheat, 330 miles from market, is not worth the hauling by waggon, but by rail road it will be worth $45 55.

Thus it appears that the value of land enhances as its distance from a rail road diminishes. From this view of the case, every farmer ought to strain every nerve to bring a rail road through the district in which he lives.

By building all the roads now chartered, nothing can prevent or retard the prosperity of the State. Three parties have each its respective duties to discharge. The company must be punctual in its payment to the contractor, and the contractor must be equally so to the working men whom he employs; and in their turn, the laborers must exercise reasonable forbearance towards the contractor, and keep clear of combinations, which generally end in their own ruin. The conduct of both the company and contractor must inspire confidence in the men employed to execute the work, and they, in their turn, have no right to raise factious opposition, or indulge in unfounded apprehensions. When any of these three parties is guilty of a breach of duty towards the other two, the public suffer by the conduct of the delinquent party, while one, or both of the other two parties, may be utterly ruined.

CHAPTER X.

A few years ago, the want of good roads was generally felt throughout this State, but this want is now, in many instances, supplied by good plank roads, which radiate from the principal towns to the surrounding districts. These roads are generally made at a cost not exceeding $2000 per mile. The plank must be renewed every seven years, and oftener, where the travel is considerable. The plank used should be good oak, as any other description of wood is found not to answer so well. Pine wears out in three or four years. Only half the roadway is planked, as when two vehicles meet, one sides out and allows the other to pass; when one is empty, or lightly loaded, it always sides out, and allows the loaded vehicle to pass without interruption.

There are seven plank roads issuing out of Milwaukee; and, indeed, every town and village in the State either has its plank roads already constructed, or is preparing to do so. Stock invested in plank roads was found to pay well some time ago. The charge or toll per mile is moderate, averaging two cents for a two horse vehicle per mile, and one cent for a single horse one. It would be difficult to enumerate all the plank roads built, in progress, and in contemplation throughout this western country.

The principal obstruction hitherto opposed to the progress of farming in the Western States, has been the roads, which, except in summer and frosty weather, and when the ground was covered with snow to some depth, were almost impassi-

ble. But now, this great want of the farmers and business men is, in many places, amply supplied by plank roads. The utility and economy of plank roads are now so well understood and appreciated, that every district is anxious to enjoy the advantages of these commodious highways, and I have no doubt, before many years, the State will be traversed in every direction by these lines of communication.

Plank roads were first built in Canada, where several hundred miles are in operation. The average cost of construction per mile there was $2100, which is small, as compared with the cost of Macadamized roads. The system of plank roads was introduced into the State of New York about seven years ago, where 2160 miles are now registered, at an average cost of $1833 per mile.

Plank roads cost considerably less than roads made of broken stones, and are more easily kept in repair. They also oppose less resistance to the force of traction. On the Salina and Central road, in the State of New York, for a wager, a team drew, without extraordinary strain, six tons of iron a distance of 12 miles, to Syracuse. A team of horses can draw, on a plank road, 4½ tons, day after day, travelling at the rate of from three to four miles an hour. On a newly constructed Macadamized road, the resistance is very considerable, and will take some time before it becomes smooth and solid. Where the travel is considerable, such a road will require repairs every year, whereas a good plank road will last for 6 or 7 years, if oak be employed in the construction. A mile of Macadamized road will, at least, cost $3,400, besides $200 per annum for repairs. The cost of making a plank road averages about $2000, and the annual repairs about $7 per mile. I have lately laid out a plank road which will not cost this sum, though it has some

heavy cuttings on it. Where saw mills are not convenient, a moveable one, worked by steam, generally follows the workmen, by which the expense is considerably diminished. This plan was adopted on the Sheboygan and Fond du Lac plank road, by Mr. McCrea, the banker, of this city, and he found it to effect a considerable saving.

A good deal of trouble has been taken to ascertain the comparative efficiency of plank roads, as compared with roads made of broken stones; speed and load being the two elements entering into the comparison. These experiments have resulted in giving the preponderance in favor of plank roads, in the ratio of 2½ to 1, to 6 to 1. Farmers now can take 1½ cords of wood on a plank road, while on the common roads ½ or ¾ of a cord is the usual load. Now, 80 bushels of rye and 100 bushels of oats are carried on a plank road, while, on the common roads of the country, only 40 and 50 bushels are carried. On a plank road, all this is effected at the rate of four miles an hour, whereas, on a common road, the rate of speed is only three miles an hour, at most.

Some are of opinion that plank roads are injurious to horses, but, in reality, "there is nothing to warrant the inference. On the contrary, it may be said, without any fear of contradiction, that the horse, when not pressed beyond his strength, can work longer, and be always in a better condition on a plank road than on any road whatsoever."

It is impossible to overrate the value of plank roads, as compared with the common roads of the country. Except in summer and when the ground is frozen, or covered with snow, it is next to impossible to travel with a load. But on a plank road, the farmer can bring his produce to market at any season of the year, and thereby take advantage of the market when prices are high. No one in the old country can form

an idea of the state of the roads in this western world in wet weather. And the streets, when not planked, are still worse. The mail-coach, on arriving opposite the post-office, in Chicago, stuck in the mud for some days, and was dragged out with much difficulty. The increasing business of that great and prosperous city demanded a better state of things, and now, carriages innumerable are seen rolling every minute of the day over well-constructed plank roads.

It is almost unnecessary to state that the wear and tear of horses, harness, and vehicles are considerably reduced by the substitution of plank for common roads, besides the saving of time, trouble, and annoyance attendant upon mud roads—a name not by any means inappropriate when applied to most, if not all, the common roads of the country. The saving in wear and tear, and in time, is more than sufficient to pay the tolls on plank roads, and the balance is in favor of the farmer, not to mention numerous other items which these roads place to his credit, such as the time and trouble lost in cleaning horses, harness, vehicles, &c. Plank roads are valuable even to a farmer unable to keep any description of draught cattle; as the carriage of his little produce will cost much less.

Every public work in this country is the offspring of sheer necessity, and no country in the world is so economical in its public expenditure. In opening a new road, it not unfrequently happens that only a bare track is established, by clearing away the trees and underbrush, which is afterwards improved when the district finds itself in a position able to afford the necessary expense. Everything is done to answer the present purpose, and let the future provide for itself. In the old country everything is done to last forever, regardless of cost; in this country, the first cost is limited to the bare working condition of the work, but is subsequently improved

by its own receipts. This is the common sense course to be pursued in a new country where capital is yet limited.

If we were to build rail roads, plank and common roads with as little regard to the first outlay as is manifested in England, where a single bridge or tunnel, or a depot, may cost more than would be sufficient to construct a long line, in workable condition, in this western country, we should wait perhaps for many years before we had the means to commence. When the country is in a condition to afford to combine ornament with useful effect, I have no objection to do so; but in its present condition, a plain road and a plain bridge, and a plain looking depot, or station house, are true signs of wisdom and economy, which here invariably lead to profit and ultimate improvement.

In laying out a plank road intended for a single track, the plank is put on the left hand side of the road leading from the town or city. The right hand side should be raised a little higher than the planks, by which the adjacent ends are secured to their places and prevented from shifting. The left hand ends of the planks are secured in a similar manner, by raising the clay a little higher than the surface of the planks, and ramming it quite solid. Before the planks are laid on, the surface of the road should be rolled, and the sleepers firmly imbedded in the soil, the upper side being level with the earth. In laying the planks, care should be taken that they lie close together, which can be effected by using a heavy maul. The greatest defect I observe in the construction of our plank roads, is the want of thorough drainage, than which nothing could be more injurious. When water is allowed to lodge under the planking, it splashes up between the joints, as the load passes over it, to the great injury and annoyance of the animals and the persons who guide them. Besides this injury and annoyance, the plank soon rots un-

the influence of the sun and water. Nothing can obviate this but a close adherence of the planking to the surface of the road-stuff, and thorough drainage, which last can be effected by giving the road a proper slope from the centre towards each side; and by cutting good side channels, giving them also a sufficient fall to carry off the water. This mode of planking a city would by no means answer. The planks should be firmly nailed to the sleepers. In a town or city, a double track is indispensable. Sometimes a single track is laid down on each side of the street, and the centre covered with the usual road-stuff employed in the locality. This is the plan adopted in some of our streets in Milwaukee. In Chicago, the planking extends across the street from curb to curb, all being firmly nailed to the sleepers fixed in the soil, and the road having a convexity sufficient to convey off the water to either side. This plan is adopted by the present surveyor of that improving city.

The progress of our infant State is indeed truly astonishing. Besides the foregoing list of rail and plank roads already made and projected, all our towns are connected by telegraph wires, which enable us to communicate intelligence to every part of the States and Canada. We have in Wisconsin two competing lines of telegraph, both communicating with the Eastern States and Canada. The length of one line within the State of Wisconsin is only forty miles, and communicates intelligence from Milwaukee to the following places, viz: Oak Creek, Racine, Kenosha, and, by Illinois, to Mineral Point. The length of the second line is between six and seven hundred miles within the State, and communicates intelligence from Milwaukee to the following places, viz: Port Washington, Sheboygan, Sheboygan Falls, Green Bush, Fond du Lac, Oshkosh, Neenah, Menasha, Appleton, Green Bay, Whitewater, Janesville, Beloit, Jefferson, Lake Mills, Madison,

Dodgeville, Mineral Point, Shullsburg, Hazle Green, Sauk Prairie, Baraboo, and Fort Winnebago, besides other places of little importance.

This is a department of practical science that has done wonders in Europe, forming it into one family circle. England and Scotland, though surrounded by water, are now connected with the Continent by an electric wire coiled into a rope, which is enveloped in a gutta percha tube, to protect it from the corroding effects of the sea-water, in which it is submerged. Now, all the potentates of Europe can make their friendly enquiries after the little Queen's health every morning before breakfast; and her Queenship can reciprocate their friendly offices while taking her tea and toast. When this hasty messenger shall have been stretched under the Irish Channel, a project that will be soon carried into execution, the premier of England can dictate his commands across the channel every morning, to keep the "Wild Irish" in check during the day.

No country in the world can compete with America in the extent of her lines of telegraph, which, if laid continuously, would exceed by more than four thousand miles the distance from pole to pole; and we have provided apparatus of transmission by which a message of three hundred words, dispatched under such circumstances from the south pole, might be delivered in writing in one minute of time at the north pole, and by which an answer might be received back in an equally quick time. The ocean itself cannot restrain the onward progress of American enterprize. A Mr. Reynolds, of New York, proposes to construct a telegraph communication across the Atlantic, at a cost not exceeding $3,000,000. He thinks the plan perfectly practicable and safe. He estimates the distance of a cape above Halifax, on the American coast,

from the nearest point of Ireland, near Galway, to be but 1600 miles along the banks of Newfoundland, which are known to extend within 160 miles of the coast of Ireland, at an average depth of eight hundred feet. A line of this length, consisting of four wires, perfectly insulated in gutta percha, of the size proposed, would last for ages, as the insulating substance is almost indestructable under water, and has a strength not much inferior to iron. Such a line, he estimates, would weigh about 10,000 tons, and would require about 1500 iron anchors. This is a bold project; but in these days of invention and progress, what can be pronounced too bold an undertaking? What would Dr. Franklin, the father of electricity, say, if he but knew what wonders this child of his creation had wrought in the world?

There is no country that I know of where skilled and unskilled labor are so much on a par, as regards wages, as in America; arising partly from the practice of attempting to do every handy-craft work without any previous training, and partly from the vast amount of manual labor to be done in the country, requiring physical strength. The circumstances of every country regulate the wages of skilled as well as of unskilled labor. In Ireland, unskilled labor is very inadequately rewarded, while professional skill is highly rewarded. This arises partly from the vast amount of labor in the market, as compared with the limited demand. No one feels more the justice of paying well for labor than I do, and as there is no country in the world where such high wages are paid for unskilled labor as in the Western States, there is no country where less reason exists for those strikes for higher wages, which we so frequently read of, among persons employed on public works. Convinced that freedom of action and freedom of labor are essential to industrial progress, I re-

gret to read of frequent recurrences of strikes among laborers on the canals and rail roads in the States of New York, Illinois, Canada, and elsewhere. Such conduct is destructive to the interests of the employers and the employed. Every man, no doubt, has a perfect right to set upon his labor whatever value he thinks proper; his labor is his own property, and therefore has a right to demand as much for it as he pleases, and should he not obtain what he demands, he has a perfect right to refuse a lower offer, and remain idle; but he has no right to control others. If others think proper to offer their labor for half what he demands for his, they have a perfect right to do so, and he has no right whatever to control them. As well as he has a right to demand a certain sum for his labor, so has the employer an equal right to refuse to pay it if he thinks it is not his interest to do so. This is just the relation that exists between the employer and the working man. The employer, of course, must have a profit on the labor of the working man, for which he ought to feel pleased; and the wages agreed upon between the contracting parties ought to be received by the workmen with thankfulness, as that is his profit upon the contract.

The history of industrial labor in America is full of revolting scenes, riots and bloodshed among laborers, which are really disgraceful, and equally destructive to the best interests of all concerned. A short time ago, a strike took place in England, which entailed a loss upon workmen and employers amounting to $1,000,000. The men held out for seven weeks, and not being able to bear up against the evils of idleness any longer, they submitted, and, after having exhausted all their funds, returned to their former employment, which, in almost every instance, is the practice. Though the employer is injured perhaps to a large extent, yet his wealth

can bear it, and he ultimately starves the poor workmen into submission. The general progress of legitimate industry opposes these disorderly strikes. If an employer shows a disposition to cut down wages below a level incompatible with the well-being of those he employs, seeking only his own private interest, they have a right to meet and remonstrate, but not to command or control, or coerce, public opinion, and the rules which govern the trade will bring him to a sense of his duty ; otherwise the workmen had better look out for a kinder employer, and he must sink under his own inconsiderate conduct. I never knew an employer to succeed who had no sympathy for those he employed, nor do I recollect to have seen the ring-leader in a strike overburthened with a stock of common sense, or persevering industry. A mutual feeling of good will should subsist between the employer and the employed. They should have no separate interest. They ought to form but one joint stock company, the capital invested by the employer being cash, and that of the employed labor—which is the source of all wealth.

The working tailors of Milwaukee struck last year for higher wages, and after walking about idle for some time, they returned to their work. I do not pretend to say which party was in fault; but I would say that an increase in rents and the price of provisions ought to induce the employer, of his own accord, to increase the wages of the workman, if the profits of his business could at all afford it. In times of unusual scarcity, the employer should and ought to increase the wages, so as to keep the working man and his family from actual want, regardless of his usual profits. But as the real friend of the working man, I would recommend to regulate the price of labor by mutual consent of both parties. In no case would I recommend a strike, as the experience of ages

proves that it is destructive to both parties. In ordinary times the demand and supply ought to regulate the price of labor like every other saleable article. By demanding too high a price for labor, the employer has only two alternatives—either to stop work altogether, or remove to another place, by which those who subsist by labor must either starve or seek for employment elsewhere. This is an unpopular subject, but my anxiety to serve the working man induces me, even at the risk of rendering myself unpopular, to give an advice which I am confident is for his good.

I cannot dismiss this subject without alluding to another subject, equally foolish. I mean those factious fights that take place on the public works of this country and Canada, between Irishmen, and those without any cause more than that one party were born in the south, and the other in the north of Ireland—because a river, or mountain, or perhaps a road separates them—because one man calls himself a Corkonian, and another a Fardowner. Scarcely a week passes without a notice of some foolish exhibition, often requiring the interference of the military to prevent loss of life and limb, which is frequently the result of these quarrels, growing out of mere names having no reference to any real occurrence on which to found a cause of quarrel. When will the common sense of Irishmen point out the folly and disgrace of such ridiculous conduct?

It is rather singular how labor divides itself among the population of America, which is composed of native Americans and the natives of every country in Europe. The Germans and Irish make good farmers, and when once settled down, it requires strong inducements to tempt them to remove; but an American is such a locomotive, from an instinctive love of travelling about, that the smallest inducement held out to him at the most

distant point of the Union, will be sufficient to set him out on his journey at the shortest notice. Most of the Americans devote themselves to trade or commerce of some kind—they seldom work at hard labor. In towns and suburbs, the Germans saw up wood and raise garden vegetables; the Irish grade the streets, carry the hod, repair and build roads, and perform all such works as require the use of the spade and shovel; the working American brings the axe into requisition, which he wields with a dexterity peculiarly his own; and the poor colored man confines himself almost exclusively to the razor and white-wash brush—he also attends table and acts as steward on board of vessels.

I have before intimated that labor brings a higher price here than in any part of the known world, while in Ireland it brings less. Therefore, as long as this great disparity continues to exist, so long will emigration continue to flow from that country to this. This inducement, apart from the low price of land here, as compared with the high price there, will induce farmers to seek permanent homes in this country, in preference to remain where they never could expect to have a permanent interest in the soil, being always doomed to work and toil for others, as mere tenants at will.

But while these inducements are amply sufficient to warrant the farmer, the laborer, and the mechanic to come and settle on the broad fields of America, I would emphatically say that this country holds out no inducement whatever to any other class not amply supplied with capital. One having money can realize more by it here than in England or Ireland, whether he lays it out at interest or puts it into business. But, to prevent disappointment to respectable persons seeking employment as clerks, teachers, engineers, lawyers, or the like, it is my duty to tell them that they had better re-

main at home. Every working man will improve his condition by leaving Ireland and coming here. The Irish laborer is well adapted to the laborious work of this country. When he is well fed on good American fare, he proves himself to possess a greater share of animal power than perhaps any other foreigner to be met with here, which is an additional proof of Professor Forbes' observations respecting the relative strength of natives of different countries in Europe.

Professor Quetelet tried experiments in the University of Brussels, to ascertain the relative strength of the students, as indicated by pulling out the stem of a spring of a dynamometer:

	Average height, inches.	Aver. weight, lbs.	Av. strength. lbs.
English,	68⅛	151	403
Scotch,	69	152⅛	423
Irish,	70	155	432
Belgians,	68	150	339

In corroberation of the above, an eminent engineer in London had occasion to ascertain the relative animal powers of English and Irish laborers in raising weights by means of a crane, and he found that the utmost effort of a man lifting at the rate of one foot per minute, ranged as follows:

Englishmen,	from	11,505 lbs.	to	24,255 lbs.
Irishmen,	"	17,325 "	"	27,562 "
Welshmen,		11,112 "	as utmost effort.	

These results prove that where only mere animal power is required, no one can be found to surpass, or indeed equal, an Irishman.

As connected with the subject of labor, I might mention that uneducated brute force can effect but little, as compared with the same amount of power under the guidance of scien-

tific skill. Unacquainted with the strength of materials; the properties of the arch; the laws of gravity; the properties of light, magnetism, electricity, and of fire, air and water, in all their modified forms, how could the engineer achieve all the wonders which are multiplying around us every day? A knowledge of hydrostatics and mechanics enabled Stephenson to lift the monster tubular bridge to where it now lies, connecting the Isle of Anglesea with the principality of Wales. Unassisted by the scientific agencies employed by that great man, this is an achievement that could not have been effected by the joint brute force of all the human race now living. All the joint efforts of a nation could effect but a fraction of what is performed by the engines employed in the drainage of the mines of Cornwall. All the wonders that we see multiplying around us every day are the results of force guided by scientific skill. Instance the suspension bridge crossing the far-famed Falls of Niagara, over which the traveller rides or walks in giddy security. I could multiply instances innumerable to show that everything great is the result of educated labor, and that no work of magnitude was ever the result of brute force, unassisted by scientific skill. Hence the necessity of a scientific education—an education of every day use. This education will economize animal force, by the substitution of machinery, which works under the guidance of mind, dispensing almost altogether with brute force.

We have illustrations of this fact in Milwaukee. Wm. Hawkins, of Milwaukee, has invented a stave machine, which makes from 5000 to 8000 staves in ten hours. It takes a rough stave, as it comes to market, planes it, hollows it into shape, levels the edges, makes the grooves for the head, and turns it out complete, ready to be set up in a barrel. We have, in Milwaukee, a tub manufactory—seven men are em-

ployed to attend the machinery, and these seven men, by the assistance of machinery, complete four hundred tubs in ten working hours, with handles and hoops, and perfectly polished. Unassisted by the use of this simple machinery, all the coopers in England could not turn out a tub made with the same degree of mathematical accuracy, as any one of these. This is not the result of brute force, but of mind. A rocking-chair is manufactured in Boston, beautiful in appearance, strong and permanent in all its parts, well painted, ornamented and varnished, and sold for the small sum of $5,00—all the result of machinery—the creation of mind, the child of necessity, and the consequence of dear labor. In England, such a chair could not be sold for $10 so as to give the maker a fair profit, and the journeyman fair wages. The substitution of wooden pegs, made by machinery, for the thread, effects a saving of time and labor to the shoemaker, which enables him to sell shoes and boots at low prices. Window shades and doors made by machinery are sold here at a price so low as to enable the poorest man to enjoy the light of heaven and keep out the cold. Waggon and carriage wheels are made here with great dextèrity; the farmers have wooden axletrees, which bear a weight varying from one to three tons. Many of the four-wheel carriages have wooden axles, made of hickory, which lasts for a long time. The farmer furnishes his ample waggon with springs made of the same material. Everything, almost, in common use here, is characterized by expedition and cheapness. Economy of labor is carried into every department of industry, even to the very scrubbing of the floor.

It would be well if many of these contrivances and the general mode of using them here were adopted in the old country. The gearing of the saw mills here is very simple

and effective. The work done is great, as compared with the work of a saw mill in any part of Europe. The implements of husbandry are light, and exceedingly well suited to their respective uses. I do not like the dumpy plough, but no other could be used among the stumps. The very axe and its handle are indicative of contrivance and adaptation. In some of the tailoring establishments, machinery is used to sew the garments, which duty it accomplishes with unerring accuracy. A good frame or log house is erected in this country with a degree of expedition of which few in the old country have an idea. The architectural style is rather handsome, and well suited to the climate and the existing condition of the country where nothing is made with a view to permanency—economy of time, labor and expense, governing every operation. Few of the houses in this country have fire-places, the stove having almost banished them altogether. I consider the American stove, fed to fullness with dry hickory or maple, and confined in a room without a breath of ventilation, to be the greatest enemy to man, cat or dog confined with it, that can be imagined. The American, however, is far from being of this opinion.

Returning again to the subject of improvement in machinery, with a view to shorten labor, I might observe that the patent laws of America are favorable to the progress of mechanical invention. The exorbitant price of manual labor sets every one, who has to pay for work, a-going to invent cheaper modes, by the introduction of machinery; and the small sum it costs to secure the right of any invention, by patent, is an additional stimulus to mental exertion. Thousands of useful inventions are lost to the world in consequence of the unreasonable sums demanded by the laws of England for securing to the inventor his right by patent. Nothing

could be more unreasonable than to tax a man with a view to prevent others to appropriate his property to their use. The law which protects any other description of property should extend to mechanical inventions and copyright. The patent laws of England have a direct tendency to check the progress of improvement, by taxing inventive genius so heavily as to render it impossible in most cases for the individual to pay the sum demanded to secure his right. But in America, a wiser policy is pursued. The small sum demanded to secure to the inventor the profits arising from his inventions, induces every one to secure his right even in the most trifling article which bears testimony to his ingenuity. This accessible privilege has the happy effect of accomplishing an amount of labor which otherwise, under the existing conditions of the country, would be impossible. The scarcity of hands and the consequent high price of labor demand that the law should protect mechanical inventions in this country; as, without these mechanical contrivances in small matters of every day use, the price of labor would bear, by far, too high a propertion to the profits of the employer. Indeed, at present, the price of labor is not warranted by the scale of profits in many branches of industrial pursuits. The price paid for labor by the farmer some time ago was more than he could afford; but the influx of labor from the old country will remedy this in due time. In a settled state of society, nothing is more to be desired than to see the masses receiving high wages and eat cheap food, but in a new country like this, composed, as it is, of persons without much capital, the use of machinery to work and cheapen labor is indispensable. We, therefore, ought to look upon the influx of foreign labor, not as an intrusion, but as a boon. In the same light should we view the introduction amongst us of men of science, and literature, and art, and invention.

The Commissioners of Emigration have made their annual report, from which may be collected the following facts, namely: That the increase at New York over 1850 is large. The aggregate for the last three years is 721,000. Of these, more than one-half were from Ireland, viz: 392,389; 170,971 from Germany; 84,999 from England, and 76,522 from 26 other nations and governments. While the emigration from Ireland increased from 112,591, in 1849, to 162,256, in 1851, and that from Germany increased from 35,402, in 1850, to 63,883, in 1851, the numbers from England stand unchanged, being a little rising, 28,000 for three successive years.

Nativity.

Born in	Wisconsin,	63,015
"	others of the U. States,	134,897
"	England,	18,952
"	Ireland,	27,043
"	Scotland and Wales,	7,846
"	British America,	8,277
"	Germany,	34,519
"	France,	775
"	other countries,	15,283
Deaf and dumb in Wisconsin,		85
Blind,		50
Insane,		48
Idiotic,		77

Only 666 received aid from the public funds during the year 1850, and only 238 were receiving aid on the 1st June, 1850, in all the State of Wisconsin, and these, no doubt, were aged persons, or were sick or disabled.

Most of these made their way to the west by one or other of the four great routes which are now open from the eastern cities.

Among the papers issued from the departments at Washington, is one which embodies a large amount of statistics, giving a tolerable idea of our own resources, and of the growth of this great Republic. Of the free inhabitants of the United States, 17,736,792 are natives of its soil, and 2,210,898 were born in foreign countries, while the nativity of 39,227 could not be determined. 1,965,518 of the whole number of foreign born inhabitants were residents of the free states, and 145,310 of the slave states. From these numbers it appears that the population of foreign birth forms 11.06 per cent. of the whole free population. The principal countries that contributed to the increase of our population, are—

Natives of Ireland, (in 1850,)		961,719
"	Germany,	573,225
"	England,	278,675
"	British America,	147,700
"	Scotland,	70,550
"	France,	54,069
"	Wales,	29,868
"	All other countries,	95,022
	Total,	2,210,898

The proportion in which the several countries above named have contributed to the aggregate immigrant population is as follows:

	Per cent.
Ireland,	43.04
Germany,	25.09
England,	12.09
British America,	3.68
Scotland,	3.17
France,	2.44
Wales,	1.34
Miscellaneous,	4.47

Out of 17,736,792 free inhabitants, 4,112,433 have migrated and settled beyond the States of their birth. Virginia has sent out 333,000 emigrants, North Carolina 261,575, South Carolina 163,000, Vermont and Connecticut have sent out 25 per cent. of their whole population.

This table shows that the Irish population in the States is nearly double the German population; and that the German population is about double the English population; that British America and Scotland give us equal numbers; that Wales gives us least of all; and lastly, that France sends twice as many as Wales.

The above numbers represent inversely the social and political condition of the countries opposite which they stand. The late famine in Ireland contributed in no small degree to the numbers from that country added of late years to our American population.

Mutes.—The total number of deaf and dumb in the United States, in 1850, was 9,717, of whom 5,027 were free white males, 4,058 do females, 276 male slaves, and 213 female do.

Blind.—Total number 9,702, of whom 4,519 were free white males, 3,478 do females, 239 free colored males, 255 do females; 562 male slaves, 649 female do. In this table it may be seen that the mutes are equal in number to the blind; but it does not follow that as many are born blind as deaf and dumb; as very few lose their speech in after life, as compared with the many that are deprived of sight.

It is due to the institutions of the country that the labor of so many of its population is not entirely lost, as even the blind are taught to work at some suitable trade, and learn to read by means of an alphabet invented for that purpose. As to the mutes, they are taught to read and write, and work at almost every trade.

The proportion of blind and insane is much greater among the foreign, than among the native, population.

Insane and Idiotic.—The number of insane persons in the United States is given at 15,768, of whom 15,156 are whites, 321 free colored, and 291 slaves. The number of idiots returned is 15,706, of whom 14,230 are whites, 436 free colored, and 1,040 slaves. Total whites, 29,386 ; total blacks, 2,088. The returns make it appear, that, with the whole population of the United States, there exists one insane person for each 1,290 individuals ; among the free colored, one to each 1,338 individuals ; and among the slaves, one to each 11,010. With respect to idiotcy, the white population presents one to each 1,374 persons ; the free colored one in every 895 ; and among the slaves, one in each 3,080. It is rather curious that the number of insane persons in the States is nearly equal to the number of idiots.

Educational.—The general desire manifested by the entire population to learn the rudiments of education, at least, is proved by the fact that 4,000,000 of free youth are receiving instrnctions in the educational institutions of the country on the 1st of June, 1850. This last statistical item is sufficient to account for the prosperity of the country.

Pauperism.—At the last mentioned date, only 50,363 persons were receiving aid from public funds. Of these 36,918 were natives, and 13,437 foreigners ; at an annual expense of $2,954,806. Compare this with the expense of the poor in Great Britain, in 1848, which amounted to the enormous sum of $42,750,000. I have not been able to ascertain what number of these paupers are confined to the large cities of New York, Boston, Philadelphia, &c., where newly arrived immigrants are found destitute and sick, on landing. Improvidence and dissipation are generally confined to large cities,

which will always continue to be the haunts of the idle, and the profligate. These swell the amount of pauperism, and will continue to do so as long as society is constituted as at present. No able-bodied person, man or woman, willing to work, has occasion to be a burthen on the public in this country. Compare the above number with the paupers of a single county in Ireland.

Crime.—The whole number of persons convicted of crime in the year ending June 1st, 1850, was 27,000, of whom 13,-000 were natives, and 14,000 foreigners. The whole number in prison was 6,700.

From the report of the State department it appears that during that year 315,333 immigrants arrived in the United States, but, having land enough in that year to give every individual man, woman and child 113 acres of land, it follows that we can accommodate many millions of strangers still with land, amply sufficient for their use.

It may be interesting to persons coming to America to know the sanitary state of Wisconsin, as compared with other States. In the year 1850, the number of deaths in Wisconsin was 2,884, which was 1 to every 106 of the population, while in the State of Maine the ratio of the deaths to the living was as 1 to 77 1-3. The rate of increase of the population in Wisconsin was 890.48, while in the State of Maine it was only 16.22 per cent. The health of our State will appear still more striking when compared with Massachusetts, where the ratio of the deaths to the living was as one to every 51.23 ; while the rate of increase was scarcely 35 per cent., our rate of increase, as compared with Vermont, is very striking, there it amounted to only 7½ per cent.

Churches.—There were at the last date 36,251 churches of all denominations in the United States. That number not

including halls, school houses, &c., used by congregations in thinly inhabited parts of the country. There is one church for every 647 of the entire population. Each church, on an average, is capable of containing 384 persons, and the average value is $2,400.

It is really astonishing, the celerity with which churches of various denominations start up in this country. To-day you behold a wilderness, to-morrow you see a few dwellings, beneath two or three stately spires, which invariably surmount all the churches. For here there is no law prohibiting a steeple to point out the locality of the church, and announce by the sound of its bell, the approaching hour of divine worship.

The following table exhibits very interesting information as regards the different churches in the United States:

Denominations.	No. of Churches.	Seats.	Valuation.
Baptist,	8,791	3,130,878	$10,931,382
Christian,	812	296,000	845,870
Congregational,	1,674	795,177	7,973,962
Dutch Reformed,	324	181,936	4,096,730
Episcopal,	1.422	625,213	11,261,970
Free,	361	108,905	252,265
Friends,	714	282,823	1,709,867
German Reformed,	327	156,632	965,880
Jewish,	31	16,575	371,600
Lutheran,	1,203	531,100	2,867,886
Menonite,	110	29,900	94,245
Methodist,	12,467	4,209,333	14,636,671
Moravian,	331	112,185	443,347
Presbyterian,	4,584	2,040,316	14,369,889
Roman Catholic,	1,112	620,950	8,973,838
Swedenborgian,	15	5,070	108,100

Denominations.	No. of Churches.	Seats.	Valuation.
Tunker,	52	35,075	$46,025
Union,	619	213,552	690,065
Unitarians,	243	135,397	3,268,122
Universalist,	494	205,462	1,767,015
Minor sects,	325	115,347	741,980
	36,011	13,849,896	$86,416,639

The Potosi Republican contains the following statistical information relative to the religious denominations in this State, and in the entire Union, in 1850:

In Wisconsin.

	Ministers.	Members.
Catholics,	54	65,000
Methodists,	100 travel'g,	7,947
do.	207	2,285 pr.b.
Con. Pres. As.,	98	5,048
Baptists,	53	3,451
Episcopal,	25	1,356
O. S. Presbyterians,	24	552

In the United States.

	Ministers.	Members.
Catholics,	1,109	1,233,350
Methodists, N. and S.,	6,372 travel'g,	1,218,172
do.,	9,401 local,	93,785 pr.b.
O. S. Presbyterians,	2,027	210,306
N. S. do.,	1,596	140,000
Congregational,	1,687	197,196
Baptist,	5,142	715,737
Episcopal,	1,558	80,000
Lutheran,	658	200,000
United Brethren,	503	67,000

The above table may approximate the truth, but I do not vouch for its accuracy. Besides these, there are numerous other sects, such as Universalists, Swedenborgians, Painites, Freethinkers, besides several others who belong to no religious sect whatever. I have seen but few Quakers.

Catholic Diocese of Milwaukee—Rt. Rev'd J. M. Henni, D. D., Bishop.—In this diocese there are 113 churches, 7 private chapels, 25 in course of construction, 59 missionary churches, 69 clergymen, 1 ecclesiastical seminary, 1 college, 5 religious communities, 6 female academies, 4 charitable institutions, and a Catholic population of 90,000.

Milwaukee city has 6 Catholic churches, Milwaukee county 11, Racine county 5, Kenosha county 5, Waukesha county 9, Ozaukee county 8, Washington county 10, Jefferson county 3, Dodge county 6, Walworth county 3, Rock county 3, Dane county 3, Iowa county 4, Lafayette county 4, Grant county 6, Crawford county 3, Marquette county 1, Columbia county 2, Fond du Lac county 6, Calumet county 2, Sheboygan county 4, Manitowoc county 5, Brown county 2, Winnebago county 2, Outagamie county 1. Besides these, there are several missionary stations.

Ecclesiastical and Literary Institutions.—Seminary of St. Francis, Jefferson street, Milwaukee ; St. Norbert's Premonstrant Convent, near Prairie du Sac ; Sinsinawa Mound Dominican Convent, J. T. Jarbee, O. P., Prior Sinsinawa College—this has high claims on the public patronage ; Convent of the School Sisters of Notre Dame, Knapp st., Milwaukee ; Convent of the Sisters of St. Bridget, Kenosha ; Academy of St. Mary of the Holy Angels, for young ladies, Milwaukee ; St. Joseph's Female School, Milwaukee ; St. Mark's Day School, Kenosha ; Sinsinawa Female Academy ; St. Cecilia's Day School, Dotyville, Fond du Lac Co., Holy Cross Day

School, Ozaukee Co.; St. Joseph's Free School, Milwaukee; St. Joseph's Female Free School, Milwaukee; St. John's Female School, Milwaukee.

Charitable Institutions.—St. John's Infirmary; House of the Third Order of St. Francis Assisium, Nojoshong; St. Aemilian's Orphan Asylum, Milwaukee; St. Rosa's Orphan Asylum, Milwaukee. Benevolent Associations:—St. Salesius, St. Aemilian, St. Rose's, Ladies' Seminary, St. Joseph's School, St. John's Young Men's, Holy Rosary, The Archconfraternity of the Sacred Immaculate Heart of Mary.

The Catholics have church property of the amount of 9,000,000, and all the other denominations have only $27,416,730.

Episcopal Diocese of Wisconsin—Rt. Rev'd J. Kemper, D. D., Bishop, whose residence is at Delafield, Waukesha Co. The Protestant Episcopal clergymen connected with this diocess reside in the following places: Delafield, Milwaukee, Waukesha, Lisbon, Green Lake, Dartford, Green Bay, Sheboygan, Racine, Kenosha, Duck Creek, Watertown, Beloit, Fox Lake, Delavan, Janesville, Toland's Prairie, Fond du Lac, Grant Co., Madison.

Besides the above, there are several missionary stations. The number of Episcopalians in the State is estimated at 1,356.

From the minutes of the Presbyterian and Congregational Convention, published in 1854, it appears that there were then connected with the convention "about 113 churches, 100 ministers, and 4,000 members."

CHAPTER XI.

From all the facts stated in the foregoing pages, and from the temperature, as indicated by the thermometer in different parts of the State, we can draw inferences indicative of what the climate may be in the course of time, under altered circumstances, as well as describe its present condition. The chief modifier of climate, and the agencies that exercise the greatest influence, are evaporation and condensation of water, whose influence is felt in Wisconsin to a very high degree. The heavy dews, peculiar to the lake districts, tend to equalize the temperature of the nights, so that the cold mornings, so common in the Middle and Western States, (far removed from large bodies of water,) during the summer months, are unknown in the lake districts, the amount of caloric evolved in condensing the vapor exhaled in the early parts of the night, rendering the mornings mild and pleasant. Clouds and mists modify the climate considerably, obstructing, as they do, the caloric radiated from the surface during the night, and reflecting it back to the earth. Clouds and mists prevail in the neighborhood of large bodies of water more than in dry localities, where caloric is radiated, during the night, into space, unobstructed by clouds, to reflect any part of it back, and causing cool mornings in summer. Hence we see why the temperature of the lake region is modified in winter by the cloudy state of the atmosphere, which in summer tends to ob-

struct the passage of the sun's rays, and thereby keep the atmosphere cool. In the process of freezing water, a great quantity of heat is evolved, and while employed in the process of melting ice, a vast quantity remains latent : therefore, we are not surprised that our great lakes tend to modify the range of the thermometer, lessening the cold in winter, and the heat in summer. This is illustrated by a reference to the mean temperature at Fort Howard, on Green Bay, and Fort Snelling, on the Mississippi :

	Latitude.	Main T.	Wint'r.	Sum'r.	Range of Ther.	
	deg. min	deg. min.	deg. min.	deg. min.	deg.	deg.
Fort Howard,	40.40	44.3	20.5	67.7	— 16	† 99
Fort Snelling,	44.58	44.8	16.3	72.0	— 23	† 115

This table shows that during the winter the mean temperature of Fort Howard is higher than at Fort Snelling, but that during the summer it is lower, showing that the proximity of the large lakes equalizes the temperature while, at a distance from such collections, the extremes of heat and cold are more distant, but the annual temperature is nearly the same. Latitude has less influence on climate than is generally supposed ; for instance, the mean temperature of Fort Brady is nearly two degrees lower than that at Fort Williams, though the latter post is nearly one degree farther north. The difference arises from the fact that Keweenaw Point is bounded on three sides by water. On account of the insular position of Ireland, the extremes of heat and cold are not felt.

Though parts of Ireland are much farther north than parts of France, yet the winter in the former country is not near so cold as in the latter, nor the summer so warm. The influence exercised by a cloudy atmosphere arises considerably from the known fact that the force of radiation from the earth

into space increases as we proceed northward, and also with increased elevation above the level of the sea. This last element (altitude) exercises considerable influence in lowering the temperature; hence it is that the tops of high mountains in low latitudes are covered with snow, while the intensity of the heat at the bottom is almost insupportable. Independently of altitude, the direction and form of mountain ranges have a great share in adding to, or mitigating the rigor of, a climate.

From these known principles, the outline of the general features of Wisconsin would enable us to form an opinion of its climate. The contour of the country shows that a free passage is afforded to the north-west wind across the State, which is the coldest we ever experience, and especially when it passes over the middle and Mississippi region, where its course is unbroken, except by the forests extending in a westerly direction from the head waters of the St. Croix, as far as the government surveyors had extended their labors. When the winds blow from any of the large lakes, they are a good deal tempered from causes before mentioned. Sandy plains are colder than forest lands, on account of the former possessing greater radiating power. Hence it is that the north winds passing over Lake Superior, and descending upon the region south of the water shed, are rendered comparatively mild, even in mid-winter, until reaching the sandy regions, where the temperature is considerably lowered before they reach the country farther south, giving to it a more excessive climate.

In winter the north-east and east winds are greatly modified, while in summer, the south-west winds, passing up the valley of the Mississippi, and deflected east by the western chains of high lands and mountains, are both temperate and

healthful. In the middle and southern parts of Wisconsin, the northern breezes tend to cool down the air, and the same effect is produced by the southern winds, which are frequently accompanied by rain. The vast number of small lakes dotting the north-west portion of Wisconsin tend considerably to abate the excessive heat of mid-summer and modfiy the cold of winter, but not in the same degree, as they are covered with ice during a considerable portion of the winter season. The same observation applies to the swampy lands.

The sandy regions of the State are warmer in summer than those resting on a clayey soil, owing, in part, to the reflecting power of the sand. Every wind unaccompanied by rain, except the north-west, contributes to increase the heat of summer, modified, however, by the configuration of the country, and other circumstances. Naked rocks, sandy plains, dense forests, extensive prairies, large bodies of water, large rivers, numerous lakes, elevated ranges, &c., exercise no small influence in forming climates. I have been able to survey in the forest for a whole day, without gloves, when I could not venture to do so on the prairie, with almost any quantity of clothing consistent with a working condition.

The springs are colder in the lake regions than farther in-land, in consequence of the volume of caloric rendered latent in the process of melting the ice and snow, whenever they accumulate during the winter. This, of course, retards vegetation, but when spring opens, the danger to which early vegetation is exposed, in the middle and far-western States, from sudden alterations of temperature, is altogether unknown in the northern parts of Wisconsin. Though the springs are later in the northern parts of Wisconsin than in the middle and southern parts, yet the crops are not much later.

Throughout all Wisconsin, the winters are dry, the air

bracing and invigorating, and the sky generally free from clouds. In frosty weather there is seldom much wind. To all these conditions of the atmosphere, I attribute the absence of that uncomfortable cold feeling often experienced in much more southern latitudes. I felt colder in Ireland in winter, with the thermometer several degrees above zero, than in this State, with the thermometer ranging from ten to thirty degrees below zero. A laborer works out doors here in his shirt sleeves, under a degree of cold which could not be endured in England or Ireland. It is only in April and May, when the thermometer rises, that I felt any sensation of cold, owing, no doubt, to the quantity of moisture in the atmosphere during those months. It is not easy to distinguish by sensation the difference between the positive effects of the pretty high, and the negative of the very low, thermometric scale. If you handle a piece of iron in very frosty weather, it will blister your finger as quickly as a hot iron; the trigger of a gun will speedily blister the fingers, and a jack-knife in the breeches pocket will make one jump as with a sudden scald. In fact, the sensation of a pretty high positive degree of heat, and of a large negative degree, (which we call cold,) is the same, when the atmosphere is dry.

There is much more clear weather in the middle and southern portions of Wisconsin than in the States farther south, and more cloudy weather in the northern parts of the State than in the south. On account of the large bodies of water and extent of forest in the northern parts of the State, more rain actually falls there than in the southern portions, the evaporation being more copious from the lakes and forests. Evaporation from the foliage of the forest tends to keep the atmosphere in a humid state, while the direct rays of the sun are intercepted, preventing evaporation from the earth. Hence

it appears that a forest has a tendency to equalize the temperature of a climate, preventing those extreme degrees of heat and cold which are felt in an open, unprotected country. Elvated prairies and sandy plains have a drier atmosphere than forests, but the difference of temperature between day and night, and between summer and winter is greater.

The temperature of the streams flowing into Lake Superior, as compared with that of the tributaries of the Mississippi, proves the effect of a northern, as compared with that of a southern aspect. Though many of these tributaries take their rise from the same lake or swamp, yet the difference of their temperature, even at a small distance from their common source, is astonishing. The mean temperature of two countries may be equal, and still the climates may be quite different. One country may enjoy very hot summers, and endure very cold winters, the mean temperature of which may equal the mean temperature of a moderate climate, neither too hot or too cold. And though the mean temperature of two climates may be equal, yet their effect upon vegetation and health may be very different. The climate of Ireland clothes her with a rich and lively mantle of everlasting verdure, but is too cold to ripen the grape, or bring a squash to maturity; while parts of America, having the same mean annual temperature, produce and ripen these to the greatest perfection, the heat of summer being sufficiently intense for that purpose, but the intensity of the winter cold so great as to destroy all traces of vegetation. Hence the necessity of knowing the annual temperature of a country to form an opinion of its agricultural capabilities, so far as climate is concerned.

From the preceding remarks, we may easily conceive why the difference between the winter and spring is greater in

Wisconsin than it is in the midland States, and also, why the difference between spring and summer, and summer and autumn is not so great in Wisconsin, especially in the lake regions, as in the middle States.

Vegetation, as a general thing, is a true index of climate and temperature. This is proved by the remarkable coincidence between the vegetation of Alpine districts, as you ascend, and the middle latitudes northwards. The relation between this ascending forest vegetation, and the distribution of trees over the temperate and frigid zones, as you travel northwards, is so striking that it may be considered as a universal law, modified, however, by those influences which constitute the contrasting peculiarities of distant shores, differently posited as regards aspect. In ascending from the vine-producing plain to the top of the snow-capped mountain, we pass in the course of a single day through several zones varying in temperature and forest productions. In ascending the Alps, in Switzerland, a difference in vertical elevation of three hundred feet will produce a change of 1 deg. Fahrenheit in the mean annual temperature; therefore, a journey to the top, say of six thousand feet, will produce a difference in the mean annual temperature of 20 deg. of Fahrenheit. The temperature at the foot of the Alps is similar to that in latitude forty degrees north; and as we travel towards the north, a diminution of one degree in the temperature takes place for every sixty miles; therefore, we should travel over twelve hundred miles north from the 40th degree of north latitude before experiencing the same climatic changes, as in travelling from the foot of the Alps to a height of six thousand feet, which may be done in one day. From the influence of climate on forest vegetation, and from the facts above stated, it follows that a narrow, horizontal zone of Alpine flora corresponds to

a broad zone of northern vegetation, stretching over an extended plain. Trees that grow well at the foot of an Alpine region will disappear as you ascend to a higher zone, which will be occupied by others of a different species; and trees that succeed well under the genial influence of the sun in a low latitude, will altogether disappear in a high latitude, which will ultimately be wholly occupied by pine and birch forests, corresponding exactly with the growth of high regions in Alpine districts.

From the connection between climate and vegetation, we are not to be surprised at the geographical distribution of plants. Animal life, too, having the full power of locomotion, seems to be confined within geographical limits, showing an intimate connection between organized existence and the external world. This is fully illustrated by the fact that certain tribes of fishes are confined to limited oceanic zones, never being found farther north or south. The parallel between elevation, (as illustrated above in forest vegetation,) seems to be carried out in the animal kingdom. The shells and fishes found in the head waters of large rivers are scarcely ever the same as those inhabiting their middle or lower course; showing that certain elevations above the surface of the ocean are distinguished by distinct groups. These groups are said to be identical with the inhabitants of fresh water lakes occupying zones of equal temperature; which shows that the same law which regulates the geographical distribution of plants is strictly obeyed in the distribution of animal life, modified, however, by local circumstances, such as suitable food and other elements essential to their well-being. Similar exceptions may be made to the law of geographical distribution in the vegetable kingdom. The lepidosteus is found in the St. Lawrence, in Lake Ontario, Erie, and Mud

Lake, in Lakes St. Clair and Michigan, but never ventures as far north as Lake Superior, though there is no natural barrier to prevent it. In the open sea, which presents no natural barrier to marine animals possessing powerful locomotion, the same law of geographical distribution seems to be obeyed, by confining distinct tribes within certain limits.

Land animals, perfectly unrestrained, seem to classify themselves into families, which are confined within certain geographical limits. Those, however, under the control of man, are made to adapt themselves to numerous varied circumstances, extending far beyond the natural limits prescribed to them in their wild state.

We derive additional evidence from the migration of birds, to show, that in the plan of creation, animals are intended to be located within certain limited boundaries. Birds wander at the approach of winter into temperate climates, but are never known to pass from the northern to the southern hemisphere. Those birds which go south from the Arctic region are sure to return at regular stated seasons. Fishes, also, which migrate at the approach of the spawning season, never fail to return to their former abodes. This desire of living within limited native boundaries, impresses me with the conviction that animals in general were intended to live where they were created—man is an exception; and those animals under the influence of man, may be adduced as another, but not with equal propriety, as the change of place is not a voluntary act on their part, but rather the result of artificial restraint or education. At the discovery of the most distant island in the ocean, it is generally found inhabited by some animal dissimilar, perhaps, in character, to any other known to naturalists, or agreeing, in many of its leading characteristics, with others at a distance, but not in all. If no other

the world be like the isolated inhabitant of the island, how came it there? Did it leave its native country and travel by land and water over thousands of miles to seek a home in a desolate island, leaving no other of its kind behind? This is absurd, and, to say the least of it, most improbable. I would be inclined to the opinion that the animal had been created in the region where it was found.

Were I to consult my own inclination, I should pursue this subject to some length; but as I only mean to throw out a few hints showing how closely the habits, well-being and physiology of plants and animals are connected with, and dependent on, climate. I confine myself to the statement of ascertained facts, derived from the researches of modern naturalists, which seem to contradict some theories of long standing.

Among the most curious researches of the present day may be ranked those of the celebrated Professor Agassiz, in relation to the resemblance which is seen between the early stages of growth in fishes, and the lower forms of their families in the full-grown state; and also to a similar resemblance between the embryonic forms and the earliest representations of that class in the oldest geological epochs—"an analogy which is so close, that it involves another most important principle, viz: that the order of succession in time, of geological types, agree with the gradual changes which the animals of our day undergo during their metamorphoses, thus giving us another guide to the manifold relations which exist among animals, allowing us to avail ourselves, for the purpose of classification, of the facts derived from the development of the whole animal kingdom in geological epochs, as well as the development of individual species in our epoch." This principle being admitted, the investigation of embryology

would throw a vast amount of light upon the succession of fishes of all geological periods, as well as upon the succession of other animals of olden times, now found in a fossil state.

Climate being as intimately connected with agriculture as soil, I have devoted more space to its discussion than perhaps the intended limits of the present work would warrant; therefore, I shall bring the subject to a close by referring to the following tables, and also by saying a few words descriptive of our beautiful Indian summer, which generally commences about the 15th or 20th of October, and ends about the 20th of November.

No European can form an idea of this delightful season, in which the poor Indian collects his scanty harvest of Indian corn and wild rice—burns the vast prairie to facilitate his hunting excursions, and collect game. The quantity of smoke ascending from these fires tend to diminish the brilliancy of the sun's rays, rendering the light much more pleasant. The expanse of prairie on fire during this season is so vast that the atmosphere is impregnated with the smoke for thousands of miles in every direction. The eye is relieved by the partial obscuration of the glare that precedes it, just like the sensation produced by surrounding a brilliant gas light with a globe of ground glass to diminish the glare and render the light much more pleasing. Such of the prairies as escape this process in the Indian summer, is doomed to suffer in the spring, in order to allow the young grass to shoot up for cattle to feed on. The white intruder assists in this operation for a similar purpose. The name, "Indian summer," must have taken its origin from the Indians' occupation during this season, the only time they seem to provide for, or even think of, their future wants. To what shall I compare the Indian summer? "To the last and unexpected flare of a dying taper—

or to the warm, transient, but rosy glow which will often steal over the snows of the distant Alps, after the sun is far below the Jura, and after they have been seen rearing themselves for a while, cold and ghastly white, over the horizon. During the Indian summer, the air is calm. Glistening strings of gassamer, woven by the aeronaut spider, stream across the landscape—all near objects are seen through a dreamy atmosphere filled with a golden haze, while the distance melts away in violet and purple."

By inspecting the following tables, it will be seen that the thermometer does not stand very high more than two or three days together, and that we seldom have intense cold weather more than about three days in succession. What is principally against the climate of Wisconsin, as well as the other Western States, are the sudden transitions from heat to cold, and from cold to heat. If the rains were more frequent, but not so heavy, in these States, it would benefit the agricultural interests of the country, by promoting vegetation. But, from what has been stated in this chapter, it is easy to foretell that some, at least, of these defects in the climate will, in time, be obviated. When the country is cultivated, drained, and cleared of forests, except belts left for protection against adverse winds and weather, the sudden changes of weather, so unpleasant and injurious in their effects, will be unknown. Our summers will be warmer, and our winters colder; but the seasons will be more steady and certain.

The following tables will show that the State of Wisconsin is the most healthy State of the Union, save and except Minnesota and Oregon. The small number of deaths, as compared with the living population in these States, may be accounted for from the fact that the population of these two States is composed principally of foreigners who have recently

settled in them, among whom is a large proportion of adults, not so subject to disease, ending in death, as a mixed population composed in part of old persons and young children, whose chances of dying increase with their distance from that period of life at which most persons remove to a distant land. In Wisconsin, the ratio of the deaths to the number living is as 1 to 105.82, in Minnesota as 1 to 202.56, and in Oregon as 1 to 282.82. But comparing Wisconsin with an old State, for instance Massachusetts, where the deaths compared with the living are as 1 to 51.23, we see the former is twice as healthy as the latter. In this comparison, however, we must recollect that among our present population are large numbers of foreigners who but recently settled amongst us; but comparing with any State of the Union, whether young or old, except Minnesota and Oregon, Wisconsin is by far the most healthful.

Meteoralogical observations made at Summit, Waukesha Co., for 1850, *by Edward W. Semer.*

	max.	min.	mean.	Weather.
Jan'y,	43	-8	25.80	Fair days, 152.
Feb'y,	48	10	26.87	Cloudy, 124.
March,	58	6	31.06	Rainy, 54.
April,	72	17	40.12	Snowy, 3.
May,	82	28	52.58	Changeable, 32.
June,	88	42	67.62	Wind N. 12, S. 27, E. 34, W. 56.
July,	91	50	72.13	Changeable 56, N.E. 16, S.E. 45.
August,	86	48	70.67	N.W. 38, S. W. 66, Calm 15.
Sept'r,	76	34	58.50	
Oct'r,	71	22	48.66	
Nov'r,	64	12	38.49	
Dec'r,	42	3	20.83	
Mean,	91	10	46.08	

Monthly mean temperature at Beloit, by Prof. Lathrop, 1850.

January,	25.33	May,	54.25	Sept'r,	59.72
Feb'y,	27.50	June,	69.50	Oct'r,	49.50
March,	31.50	July,	74.10	Nov'r,	39.50
April,	40.50	August,	71.00	Dec'r,	24.00

We have very few foggy days in Wisconsin, the number in the course of the year ranging from two to four days. I have never observed anything bordering on a dense fog similar to what is seen in England or Ireland; and when we happen to have a foggy day, it lasts but a few hours. More than two hundred days in the year are fair, and our rainy days do not exceed fifty-four days.

Sometimes this State is visited by water-spouts. One was observed at Southport, in 1843, which is described in the Southport Telegraph. At the distance of ten or twelve miles from the shore was observed a dense cloud, from which descended a thick vapor in the form of a reversed pyramid, the surface of the water beneath it appearing considerably agitated, "bubbling, foaming and rising up in hundreds of little sharp pyramids of various heights, until at length an aqueous cone rising upward, united with the descending one, forming a volume apparently some two hundred feet high, and exhibiting the form of two funnels united at the little ends, the point of contact being much the smallest part of the column. In the middle of the column was seen what may be termed a transparent tube, through which the water appeared to rush with a spiral motion, and with a velocity truly wonderful." These phenomona depend upon electric influence; they take place in months peculiarly subject to thunder storms, and flashes of light are occasionally seen moving about them with prodigious velocity. They have been often dispersed by pointing a sword towards them—a common prac-

tice at sea; which proves that electricity is the prime agent in the formation of these phenomona. Signor Beccaria proves the analogy between the phenomona of water-spouts and electricity, by hanging a drop of water to a wire communicating with the prime conductor, and placing a vessel of water under it. Thus circumstanced, the drop assumes all the various appearances of a water-spout, both in its rise, form, and manner of disappearing.

We have thunder storms here much more frequent than in England, and by many degrees louder. To a new-comer the roaring, cracking, reverberating sound is fearful; but finding it, except in very rare instances, harmless in its results, his fears soon subside. Though we seldom hear the electric fluid destroy life, yet nothing is more common than the destruction of tall trees in the forest, during a violent thunder storm. A thunder storm often precedes heavy rain, and such storms are most violent in the months of Sept'r and April.

The Aurora Borealis, in these western countries is a grand display of color, illumination and movement. A large segment of the north-western horizon suddenly blazes up, reflecting the most brilliant light in every direction, and after a few moments all is darkness, which is again soon dispelled by another glare too dazzling for the eye to bear. When the concave surface of the heavens is thus lighted up, the smallest object becomes visible and continues so during the brief illumination. The color of this meteor is reddish, inclining to yellow, sending out frequent corrustations of pale light, which seems to rise from the horizon in a pyramidical, undulating form, and shooting with inconceivable velocity towards the zenith. This meteor sometimes assumes the form of an arch generally transparent, but sometimes partly bright and partly dark. These lights afford much relief to the inhabitants of

high latitudes during the gloom of their long winter nights. Many attempts have been made to acconnt for such phenomena, but I have no doubt we must refer the cause to electricity. Besides the more obvious and known appearance which constitutes a resemblance between this meteor and the electric matter, by which lightning is produced, it has been observed that the aurora occasions a very sensible fluctuation in the magnetical needle, and when its direction is lower than usual in the atmosphere, the flashes are attended with a hissing, rushing sound. This noise I have not heard myself, but I have been told the phenomenon is frequently observed in the northern parts of these States. Dr. Kane, one of the gentlemen who went in search of Sir John Franklin, mentions that he observed the aurora arcs directly over head, nearly coincident with the magnetic meridian.

It may be interesting to mention, in connection with this subject, that when the exploring party were north of the magnetic pole of our earth, the south polar direction was read by the compass as north ; the variation being 180 degrees.

The aurora is much more frequent in the fall of the year than at any other season. Sir John Ross paid much attention to this phenomenon during his exploring voyage in search of a north-west passage. I heard him read a paper, on this subject, before the British Association for the advancement of Science. He appeared to think that the lofty icebergs in the northern seas had some share in reflecting the electric light, giving direction to its course according to the shape and relative positions of these reflecting pinnacles. When electric disturbance attains a high degree of intensity, the equilibrium of the disturbance is restored by a discharge attended by a development of light.

CHAPTER XII.

Our State is laying a sure foundation to secure a high position in Science, Literature and the practical Arts. Already charters have been obtained for several institution of learning. A State University is in full operation at Madison, the Capital of the State, and the progress it has already made, under the able superintendence of the present chancellor, (Lathrop,) and a highly qualified staff of professors, is a pledge of what may be expected from such an institution, when grown into full maturity. It is under the direction of a board of visitors, consisting of twenty-one gentlemen, of whom the Governor, Secretary of State, and Judges of the Supreme Court, are members. Congress has apportioned 46,080 acres of the public lands for the support of this University. The capital arising from this source, in 1851, was $25,167 87, and the amount applied to the university, in 1852, was $1,665 51. The encouragement held out by this institution, has not induced many pupils to take advantage of it, the number receiving instructions being very small, as compared with its high character. The Episcopal church has a college under its management, at a most beautiful place, on the Twin Lakes, 27 miles west of Milwaukee. This gives high promise of usefulness. It is purely theological.

Beloit has a college, under the direction of the Presbyterian and Congregational churches, which has progressed as rap-

idly as its promoters could wish. Besides a good library, this institution has a useful cabinet, and philosophical apparatus. An addition of $21,340 has been made to the pecuniary resources of this college during the present year. A seminary for the education of females is in connection with this institution. These two religious societies have a college at Waukesha, which is progressing in prosperity and usefulness. The president is commencing a library and philosophical apparatus.

The Milwaukee University has received a charter this present year (1852.) The preparatory branch of this institution is in operation, under the guidance of a numerous Board, over which the Rev. Dr. Hunter presides. The preparatory department is conducted by professors in every way qualified to discharge the respective duties of their offices. The site chosen for the junior branch of this college is central and healthful. When funds are collected, splendid buildings are to be erected, suited to the proper wants of the senior branch of the university, which is to be chosen in some healthful locality in the vicinity of Milwaukee.

The Milwaukee Normal Institute and High School were permanently organized in 1850, and are now regularly chartered. This institution is in a flourishing condition ; it is arranged in four principal departments, and has a Normal School, with ample provision for the thorough education of female teachers. This institution has a large number of young ladies, receiving instructions in a wide range of science and literature, besides the usual accomplishments suited to ladies of the first class.

A college has been recently erected at the south side of the city of Racine, under the charge of the Episcopal church. The building is handsome, and the site beautiful. The presi-

dent, Rev. Dr. Park, is building a handsome residence for his own use, convenient to the college. From the high character of the president, this institution promises to be conducted on a plan which cannot fail to give public satisfaction.

Lawrence University has been permanently organized at Appleton, in Brown county, on the banks of the Fox River. This is under the charge of the Methodist church, and seems to answer all the purposes for which it was established. The number of pupils in attendance is very considerable. This institution is highly spoken of. The academic building connected with the University is four stories high, and measures 30 by 100 feet. The college buildings are to be on a scale which will add considerably to the appearance of that beautiful little place. Mr. Amos A. Lawrence, of Boston, the proprietor of Appleton, has given the munificent sum of $10,000 towards the expenses of this college.

At Platteville, in Grant county, is established an academy conducted by J. L. Pickard, A. M. The education afforded by this institution is said to be of a high order, and the building beautiful and commodious.

In many parts of the State, private schools furnish facilities of acquiring a sound and useful education at moderate rates.

There is no country in the world where the rising population is so amply provided with the means of receiving literary instructions as the United States. One thirty-sixth part of the State of Wisconsin is set apart for educational purposes. Every township consisting of thirty-six square miles, has the section, or square mile, numbered sixteen, placed under the charge or management of school commissioners, who are appointed annually, to attend to all matters connected with the common schools. School houses are built in every township by a tax levied upon all the taxable property, a part of which

being applied to the payment of the incidental expenses of teaching. A great number of school houses have been already built throughout the State, and every year adds to their numbers. We have, in Milwaukee, five new school houses, which, in point of extent and architectural taste, would be an ornament to any city in Europe. They are really splendid palaces, with glistening domes and imposing fronts. In magnitude and style. These institutions, though designated common schools, are a credit to our city.

The following statement, taken from the State Superintendant's report, for 1852, will exhibit the apportionment of the school fund for that year:

Counties.		Counties.	
Bad Axe,	$162 72	Manitowoc,	$315 20
Brown,	722 40	Marquette,	1,333 44
Calumet,	165 12	Milwaukee,	4,972 80
Columbia,	1,476 96	Outagamie,	373 44
Crawford,	188 16	Racine,	2,741 86
Dane,	2,076 00	Richland,	218 78
Dodge,	3,822 56	Rock,	3,702 24
Fond du Lac,	2,122 56	St. Croix,	140 64
Grant,	2,628 48	Sauk,	905 76
Green,	1,845 60	Sheboygan,	1,814 40
Iowa,	1,688 16	Washington,	3,721 92
Jefferson,	1,983 84	Walworth,	3,406 56
Kenosha,	1,868 64	Waukesha,	2,048 16
La Crosse,	11 05	Waupaca,	70 69
La Fayette,	1,352 16	Winnebago,	1,441 92
Total,			$48,931 20
Amount withheld to pay delinquent towns,			4,772 64
Total,			$53,704 84

United States Officers.

District Judge, Andrew G. Miller; Marshal, S. V. R. Ableman; Collector, John White.

Wisconsin State Officers.

Governor, Wm. A. Barstow; Lieut. Governor, Geo. T. Lewis; Secretary of State, Alex. T. Gray; Treasurer, Edwin Janssen; Attorney General, George B. Smith; Superintendent Public Instruction, H. A. Wright; Bank Comptroller, Wm. M. Dennis; State Prison Commissioner, A. W. Starks.

Members of the Senate, in 1854.

J. Q. Adams, C. Dunn, F. H. West, L. Grant, N. Dewey, R. P. Bowen, D. Howell, L. Sterling, C. Bashford, C. A. Eldridge, H. N. Smith, L. P. Harvey, J. W. Carey, B. Allen, A. M. Blair, B. Mantz, T. T. Whittlesey, J. F. Loy, D. S. Vittum, E. Miller, E. M. Hunter, G. R. McLane, J. D. Reymert, E. Wakely, E. McGarry.

Lt. Gov. J. T. Lewis, President of the Senate; S. G. Bugh, Chief Clerk; J. M. Coe, Ass't Clerk; J. M. Sherwood, Sergeant at Arms; D. O'Connor, 1st Ass't do.; D. McL., 2d Ass't do.

Members of the Assembly, in 1854.

T. Hagerty, Milwaukee; John Crawford, Milwaukee; Walter D. McIndoe, Portage; C. S. Wright, Racine; Lewis, Rood, Grant; N. R. Norton, Burlington; H. S. Orton, Dane; T. West, Racine; A. C. Ketchum, Columbia; John Smith, Racine; J. L. V. Thomas, Rock; Jas. H. Knowlton, Lafayette; P. Parkinson, Lafayette; A. Mitchell, Green; Jas. Hooker, Kenosha; Wm. P. Allen, Walworth; Jas. L Kyle, Manitowoc; M. M. Whedon, Ozaukee; C. J. Bell, Jefferson; D. L. Morrison, Jefferson; Geo. Gary, Winnebago; Alex.

Hart, Calumet; Jas. Smith, Waukesha; Edw'd Lees, Waukesha; M. K. Young, Grant; J. L. V. Terhuen, Crawford; W. Reinhardt, Milwaukee; P. Lavis, Milwaukee; Joseph Spaulding, Rock; S. G. Colley, Rock; Wm. Jeffrey, Grant; Edw'd Estabrook, Grant; Isaac J. Talmadge, Fond du Lac; M. J. Thomas, Fond du Lac; C. R. Head, Dane; P. W. Matts, Dane; S. W. Spafard, Walworth; And. Whiting, Walworth; P. W. Lake, Walworth; C. J. Rich, Winnebago; O. F. Bartlett, Walworth; S. Hale, Kenosha; W. J. Gibson, La Crosse; David Scott, Outagamie; C. H. Purple, Waukesha; L. W. Joiner, Iowa; John Toay, Iowa; D. Reed, Jefferson; Eustis, Jefferson; Parker, Dodge; William F. McCormick, Dodge; George Fox, Dodge; B. F. Barney, Dodge; A. H. Atwater, Dodge; J. W. Davis, Dodge; T. Bernhart, Jefferson; E. Boener, Fond du Lac; G. P. Harrington, Walworth; F. Densmoyer, Brown; S. McCracken, Marquette; Arc. Nichols, Marquette; J. Tobin, Milwaukee; C. C. Remington, Sauk; N. M. Donaldson, Fond du Lac; A. Rosenthal, Sheboygan; Nath. Wheeler, Richland; S. H. Baker, Dane; Har. Barnes, Dane; W. M. Torbert, St. Croix: J. Hadley, Milwaukee; P. Zimmerman, Washington; John Mathes, Sheboygan; A. Shantz, Washington; J. H. Earnest; Layfayette; W. Hull, Grant; Alf. Topliff, Columbia; D. Worthington, Waukesha; E. O'Neil, Milwaukee; H. N. Beecroft, Milwaukee; W. E. Webster, Milwaukee; D. Noggle, Rock county.

F. W. Horn, Speaker; Thos. McHugh, Chief Clerk; D. McKee, Ass't Clerk, W. H. Gleeson, Sergeant at Arms.

Among these are 40 farmers, 3 physicians, 1 shoemaker, 2 brewers, 3 notaries public, 10 lawyers, 6 merchants, 1 raftsman, 1 gun-smith, 2 clerks, 1 merchant tailor, 2 carpenters, 1 miner, 1 editor, 1 mason, 1 agriculturist, 1 real estate.

Wisconsin Supreme Court.—Chief Justice, Edward V. Whiton; Associate Justices, A. D. Smith, Sam'l Crawford.

Supreme and Circuit Judges.—First District, Jas. R. Doolittle, Racine; Second District, Levi Hubbell, Milwaukee; Third District, Charles H. Larrabee, Ozaukee; Fourth District, Timothy O. Howe, Green Bay; Fifth District, M. M. Cothren, Mineral Point; Sixth District, W. Knowlton, Prairie du Chien.

United States Senators.—Henry Dodge, of Dodgeville, Iowa county; Isaac P. Walker, of Waukesha.

Representatives in Congress.—First District, Daniel Wells, of Milwaukee; Second District, Benj. C. Eastman, of Platteville; Third District, John B. Macy, of Fond du Lac.

State Land Officers.—Register, Benjamin O. Henning; Receiver, James Murdoch. Milwaukee—Register, — Kimball; Receiver, Jonas Whitney. Mineral Point—Register, George H. Slaughter; Receiver, — Stevenson. Willow River—Register, Moses S. Gibson; Receiver, Francis P. Catlin. Green Bay—Register, Alexander Spaulding; Receiver, Edgar Conklin.

Banks.—The number of banks doing business in this State under the General Banking Law, in January, 1854, was twelve; whose total liabilities amounted to $2,450,499 09. The names and capital are as follows:

The State Bank, at Madison, with a capital of $50,000; Wisconsin Marine and Fire Insurance Company, Milwaukee, capital $100,000; Bank of Racine, at Racine, capital $50,000; Rock River Bank, at Beloit, capital 50,000; City Bank of Kenosha, at Kenosha, capital $50,000; State Bank of Wisconsin, at Milwaukee, capital $150,000; Wisconsin Bank, at Mineral Point, capital $50,000. Farmers and Millers Bank, at Milwaukee, capital $50,000; Jefferson County

Bank, at Watertown, capital $25,000; Badger State Bank, at Janesville, capital $25,000.

The above banks were chartered on the 11th January, '54. There are several other banks in the State, doing business, which are not yet registered under the banking laws, but are preparing to be regularly organized: such as Townsend & Finkler's Bank, at Milwaukee; George Papendiek & Co.'s Bank, at Milwaukee; Janesville City Bank, of Henry Bunster; Fox River Bank, at Neenah; Winnebago Co. Bank, at Green Bay; Bank of the West, at Madison; Oshkosh City Bank, at Oshkosh; Bank of Commerce, at Milwaukee; Exchange Bank, at Milwaukee; Bank of Fond du Lac, at Fond du Lac; Racine Co. Bank, at Racine; Milwaukee Bank, by Levi Blossom.

Newspapers.—There are over 60 newspapers published in the State, besides other periopicals. Of these, 8 are in the German language, one in the Norwegian, and one in the Dutch. All the newspapers are published weekly, and some tri-weekly. Daily papers are issued at Milwaukee, Madison, and Racine. Papers are published in the following towns: Appleton, Baraboo, Beaver Dam, Beloit, Berlin, Columbus, Delavan, Elkhorn, Fond du Lac, Green Bay, Inmansville, Janesville, Jefferson, Juneau, Kenosha, La Crosse, Lancaster, Madison, Manitowoc, Monroe, Milwaukee, Mineral Point, Platteville, Potosi, Prairie du Chien, Portage City, Oshkosh, Ozaukee, Racine, Ripon, Sauk City, Sheboygan, Sheboygan Falls, Shullsburgh, Stevens' Point, Watertown, and Waukesha.

Officers of Milwaukee County.—County Judge, Charles E. Jenkins; Clerk of the Court, Matthew Keenan; Sheriff, Herman L. Page; Under Sheriff, S. S. Conover; Deputy Sheriff, Wm. Wedemeyer; do. do., John Mitchell; do. do.,

A. Seifert; do. do., Wm. Beck; Prosecuting Attorney, A. R. R. Butler; Register of Deeds, C. J. Kern; Treasurer, G. M. Fitzgerald; Clerk Board Supervisors, A. Bade; Surveyor, John Gregory; Coronor, John Mitchell.

Officers of the City Government.—Mayor, Byron Kilbourn; President of the Board, Jackson Hadley; City Clerk, Robert Whitehead; Comptroller, John B. Edwards; Marshal, John Mitchell; Treasurer, Ferdinand Kuehn; City Attorney, E. Foote; Police Justice, Clinton Walworth; City Surveyor, Wm. S. Trowbridge.

City Printers—Wm. E. Cramer, Daily Wisconsin; Fratney & Herzberg. City Sealer of Weights and Measures, Jesse M. Van Slyck.

Aldermen—First Ward—Geo. S. Mallory, Jackson Hadley, Victor Schutte; Second Ward—R. Houghton, Charles E. Jenkins, Chas. Geisberg; Third Ward—John Coughlin, John Hayden, James Reed; Fourth Ward—James Ludington, A. L. Kane, Daniel Schultz; Fifth Ward—Andrew Mitchell, E. Wunderly, Jasper Humphrey.

School Commissioners—First Ward—King, Hadley and Duggan; Second Ward—Jenkins, Brown and Church; Third Ward—Cummings, McGarry and Crocker; Fourth Ward—Powers, Butler and Day; Fifth Ward—Mitchell, Place and De Wolfe. Standing Committees for 1853-54—Finance Committee—Messrs. Hadley, Cummings and De Wolfe; Library Committee—Messrs. Mitchell, McGarry, Duggan, Church and Button; Committee on Text Books—Messrs. Place, Duggan and Powers; Examining Committee—Messrs. Day, King, Powers, Hadley and Place; Executive Committee—J. Hadley, B. Church, J. Cummings, Haven Powers, and A. Place. President of the Board, Charles E. Jenkins; Secretary, Robert Whitehead.

Standing Committees.—Finance—Wunderly, Houghton and Ludington; Judiciary—Jenkins, Mallory and Reed; Schools—Mitchell, Hayden and Houghton; Police—Humphrey, Kane and Schutte; Fire—Schultz, Wunderly and Geisberg; Printing—Kane, Coughlin and Mallory; Licenses—Reed, Schutte and Mitchell; Gas Lights—Hadley, Jenkins, Coughlin, Schutte and Humphrey; Bridges—Mallory, Geisberg, Reed, Kane and Mitchell; Harbor Com.—Hadley, Houghton and Kane; Settlement of old Tax Certificates, &c.—Wunderly, Mallory, Geisberg, Schultz and Hayden.

Commissioners of Surveys—First Ward, Joshua Hathaway; Second Ward, I. A. Lapham; Third Ward, Elisha Eldred; Fourth Ward, I. E. Goodall; Fifth Ward, Martin Delaney.

Assessors—First Ward, H. Upmann; Second Ward, B. Church; Third Ward, Richard Owens; Fourth Ward, J. S. Pardee; Fifth Ward, Martin Delaney.

Rail Road Commissioners—First Ward, A. Sawyer; Second Ward, H. Haertel; Third Ward, Daniel Murphy; Fourth Ward, S. C. West; Fifth Ward, Carlton Holland.

Justices of the Peace—First Ward, Albert Smith; Second Ward, C. F. Bode; Third Ward, Wm. Holland; Fourth Ward, Haven Powers; Fifth Ward, Oliver Parsons.

Constables—First Ward, F. Kessler; Second Ward, Geo. Fischer; Third Ward, John H. Ryan; Fourth Ward, Patrick Maloy, Jr.; Fifth Ward, Charles Mayer.

Fire Department.—Chief Engineer, John S. Fillmore; 1st Ass't Engineer, Daniel Neiman; 2d Ass't do., J. C. Goodrich; 3d Ass't do., Loring Doney. Fire Wardens—First Ward—R. C. Jacks, Frank Davlin; Second Ward, A. Hill, Nathan Pereles; Third Ward—Morris Louis, Theodore Bilty; Fourth Ward, Charles Bierbach, Charles Duvall; Fifth Ward S. H. Martin, H. S. Brooks.

Foreign Consuls—Hanover, (Kingdom,) C. H. H. Papendiek; Brunswick, (Dukedom,) Carl E. Wendt.

The city of Milwaukee is advantageously situated at the junction of the Milwaukee and Menomonee rivers, ninety miles from Chicago, eighty due east of Madison, and one hundred and four from Green Bay. The bay, at the extremity of which the town is built, is three miles broad and one mile deep. The city of Milwaukee was incorporated in 1846, and previous to 1818 it could not boast of a single white man. Mr. Solomon Juneau was not only the first white settler in Milwaukee, but the first white resident in Wisconsin, with the exception of a few settlers at Green Bay and Prairie du Chien. On the 14th of September, 1818, Mr. Juneau entered the Milwaukee river, and in 1834 built a frame house for the accommodation of himself and family, having previously built some log cabins for the accommodation of his business. In 1835, Mr. Juneau lived in a log house situated in front of the splendid store now occupied by Ludington & Co., on East Water street. The only other buildings then were five log houses, belonging to citizens now residing in Milwaukee. Mr. Juneau carried on a considerable business with the Indians, supplying them with provisions, blankets, and trinkets. The Indians mustered about two hundred, principally of the Pottowattomie tribe, tented in wigwams extending from where the United States Hotel now stands to where the German Catholic Church stands.

How different the state of things now. How different the appearance of the Queen City of the Lakes in 1854, only eighteen years from the date of incorporation. Much praise is due to the pioneer who chose the site. The bluffs surrounding the city form a sort of amphitheatre, broken by a branch of the river, which runs due west; another branch of

the river, by which vessels enter the city, runs through the town in a northerly direction. The water of this branch is employed in driving machinery of various descriptions. Part of the town lies low, and is altogether occupied by stores, ware-houses, hotels, offices, and other houses of business. The higher parts are occupied by the residences of merchants, professional men, and others desirous of enjoying a fine prospect and good air. The buildings springing up every day would be considered no disgrace to the most splendid cities in Europe; some of them are built of brick of the most beautiful color and of the most enduring quality. The stores in the principal streets would be an ornament to London or Paris. All the streets run at right angles to one another, nearly all of them having alleys. The city is divided into five wards, each electing three aldermen, one of them being elected to serve two years, and the other two only for one year, and one assessor; the aldermen elected for two years also acting as street commissioners. Each ward has a justice of the peace, and the whole city one police magistrate. The city also elects a comptroller, who has certain duties to discharge. The city has also a mayor, marshal, treasurer and attorney. The city has an engineer, who is elected by the aldermen annually. The population of Milwaukee, in 1850, was 21,000, and in 1852 the population could not be less than 24,000. In 1854 the population is 30,000.

There are in the city of Milwaukee 3 Protestant Episcopal churches, 3 Presbyterian, 3 Methodist, 2 Congregationalist, 5 Catholic, 8 Lutheran, 2 Synagogues, 1 Holland Presbyterian, 1 Norwegian, 1 Welsh, 1 New Jerusalem, 1 Associate Reformed Society. Besides these, there are other places where congregations meet for religious worship.

Among the principal hotels in Milwaukee are the United

States, the American House, the City Hotel, Cross Keys, German Hotel, Eastern Hotel, Tremont, Merchants' Hotel, Washington, Steam Boat, Keystone State, Baltic, Niagara, Crummey's, Menomonee, Clinton, Fountain House.

We have some fine halls, devoted to public exhibitions. Metropolitan Hall is tastefully fitted up, and capable of containing 1200 persons. Young's Hall seems to be the favorite resort of all who seek pleasure and instruction. This beautiful room is capable of containing from 12 to 1500 persons. It is open for public lectures, concerts, plays, &c. Metropolitan Hall is open for similar purposes. Concerts are given in Dickerman's Block, and in other places in town.

There are six fire engine houses in the city, for the accommodation of the firemen. These are handsome brick buildings, surmounted by cupolas. The market house is a fine brick building, surmounted by a handsome cupola. Many of the churches are handsome buildings, the Catholic Cathedral being far the most splendid. This edifice is an ornament to the city and a credit to the Rt. Rev'd gentleman to whose unwearied exertions and private munificence this splendid temple will be a lasting testimonial.

Milwaukee has 7 daily papers, besides weeklies and tri-weeklies. Four are in English, and three in German. There are, besides, weekly and monthly periodicals, devoted to literature and religion.

Milwaukee has 16 breweries, which are scarcely sufficient to supply the demand for beer and ale. These are celebrated for a beverage called "lager bier," a drink at present in high repute, especially among the German population, who confine themselves exclusively to beer of some sort. Lake Brewery is well known for its good ale and beer. This extensive establishment is owned by Richard Owen. Wisconsin Brew-

ery, by Best & Co.; City Brewery, by Valentine Blatz; Main Street Brewery, by J. P. Engelhardt; Washington Brewery, by L. Gallager; Gipfel's Brewery; Krüg's Brewery; Prairie Street Brewery, by J. H. Seune; Pfeiffer's Brewery, by C. Pfeiffer & Co.; Scheenk's Brewery, by N. Scheenk & Co.; Plank Road Brewery, by Charles Best & Co.; Menomonee Brewery, by Melms & Co.; Stolz & Schneider's Brewery; Ziegler's Brewery; Green Bay Road Brewery.

Our city is well provided with good foundries. Eagle Foundry, owned by Turton & Sercomb, does much credit to our new city. I am intimately acquainted with this extensive establishment, and have no hesitation in stating that it turns out as good work in all its various departments as any in the Western States, where it stands unrivalled. The Menomonee Locomotive Foundry, conducted by Walton, Lee & Co., does good work in all its different branches. It has manufactured locomotive engines for the Mil. & Miss. Rail Road, which are highly spoken of. Union Foundry, —— ——, proprietors. Howland's Brass Foundry turns out good fire engines and general work. Van Dyke's brass foundry is well spoken of. Meyers works extensively in copper. His establishment is called the Steam Brass Foundry.

The Woollen Factory on the canal water power, owned by Walter Burke & Co., does considerable business. Besides its manufacture of cloths, it turns out large quantities of ladies' shawls, which reflect credit on the proprietors, as well for the quality of the fabric as for the taste displayed in the patterns.

The Humboldt Paper Mill, owned by Noonan & McNab, manufactures large quantities of different sorts of paper. This mill is on the Milwaukee river, within three miles of the city, and has an unlimited amount of water-power.

The Soap and Candle Factory of Plankinton & Co. is perhaps the most extensive and complete, not only in the State, but in the entire Union. We have many others in the city. Hagerty manufactures good soap in the 3d Ward.

City Foundry, owned by Christoph Rosche, is well spoken of. Reliance Works are owned by Decker & Seville. Threshing machines of superior workmanship are manufactured by S. D. Cummings. The Wisconsin Iron Works do considerable business. These are owned by A. J. Langworthy. Chesnut Foundry is owned by P. Futmann.

We have Tanneries in Milwaukee which manufacture immense quantities of leather. City Tannery, on the Menomonee river, owned by Pfister & Co. They have also a sheep skin factory in the same place. Jennings' Morocco Leather Factory is the largest in the State. In Milwaukee are Johnson's Tannery, Chapman's Tannery, Shreter's Tannery, Shurn's Tannery.

We manufacture in Milwaukee excellent Piano Fortes, good Billiard Tables, good cabinet work of every description, guns and rifles, carriages, and indeed every description of work required by our population. We have good printers and good book-binders. I should like to name all our citizens who are distinguished for mechanical genius, were it not inconsistent with the plan of the present work. I cannot, however, avoid to make mention of a few who stand preeminent in their respective departments. Mr. Peters, as a watch and clock maker, is pre-eminently distinguished for his talent and ingenuity. Mr. Johnson is also highly spoken of as a watchmaker. The dredge, so extensively used in these Western States, bear evidence to the mechanical genius of the inventor—Captain Hawley.

The value of the principal articles manufactured in Milwaukee during the year ending March 1st, 1853, was $2,050,535

Commerce of Milwaukee in 1853, as taken from the Collector of Customs' report, extending from the 1st of May to the 30th of November, and showing the arrivals and departures of steam boats and sail vessels, the imports and exports, with the amount of goods, wares and merchandize imported, on which duty was paid, or is to be paid :

No. of arrivals of steam and sail vessels,	1,483
Tons of merchandize landed,	33,700
Barrels of salt landed,	48,709
Bags of salt,	45,200
Barrels of water lime,	736
Hogsheads of sugar,	2,970
Barrels of apples, green and dried,	18,500
Tons of coal landed,	8,349
Kegs of nails,	5,437
Lumber landed, feet,	15,000,000
Laths landed,	5,000,000
Shingles landed,	9,100,000
Railroad iron from England, via Canada, tons,	2,228
Transported in bond from other districts,	4,633
Cost of the iron,	$285,062
Duty on the above iron,	85,000
Sundry other articles, cost,	3,100
Duty,	1,000
Departures from Milwaukee of steam and sail vessels,	1,458
Exports of Wheat, bushels,	104,864
" Barley,	325,856
" Rye,	80,375
" Oats,	131,719
" Flour, barrels,	225,000
" Grass seed,	1,529
" Beer, half bbls.,	3,639

Exports of	Lime, barrels,	3,200
"	Brick,	2,367,000
"	Pork, barrels,	6,519
"	Beef, "	2,621
"	Eggs, "	1,199
"	bales of Wool,	2,573
"	Pearl ashes, casks,	2,254
"	Fat cattle, head,	287
"	Butter, kegs,	3,460

The collector is of opinion that ten per cent. might be added to all the above articles of imports and exports, except those on which duty had been paid.

Racine, the next in importance to Milwaukee, is beautifully situated on Lake Michigan, at the mouth of Root River, elevated more than fifty feet above the surface of the lake. It lies twenty-five miles south of Milwaukee, ten from Kenosha, and one hundred and fifty from the Mississippi. The river runs through it, leaving but a small part of the town to the north. This town occupies a level plain, and is ornamented by several beautiful churches, hotels and private houses. Its situation and general aspect must render it one of the most healthful locations in Wisconsin. It is, in every respect, well circumstanced for trade, having a good harbor, and excellent farming land west of it. It has the advantage of plank roads, leading through rich agricultural districts. It was incorporated a city in 1848.

This beautiful town has an Episcopal College, 14 churches, 3 ship yards, 3 banks, and owns 40 vessels, with a tonnage of over 4000 tons. It has likewise 1 steam flouring mill, 2 water mills, 7 mechanics' shops, with steam engines and furnaces, 2 telegraph offices, 3 plank roads, besides 2 rail roads now in the course of construction. It has a brewery, goo

hotels, good private and common schools, and a number of mechanics' shops, so common in all American towns. From its advantages and situation, I consider Racine one of the most desirable towns in the west for respectable persons to reside in. Its present population is 7000.

Madison, the capital of the State, and county seat of Dane, proves the discriminating judgment of those that located it, combining as it dses, more charming and diversified scenery to promote health and pleasure, than, perhaps, the capital of any other State in the Union.

Its silvery lakes are seen glistening in the bosom of rounded hills, clothed with refreshing shady groves of various hues, like brilliant diamonds set amidst the swelling vestments of God's most perfect work, where alone is the line of beauty delineated unbroken, distinguished the Queen of Creation as incomparably the most beautiful, the most lovely object of the creation. It is true, the scenery around Madison presents nothing bordering on the sublime ; no deep or gloomy cavern, awful to behold ; no frowning cliff of fearful height ; no projecting bluff for the eagle's foot-stool ; no noisy cataract, displaying in its spray the reflected colors of the rain-bow. The scenery of Madison is not characterized by any of those stern attributes which constitute the sublime. In its beauty and loveliness consist all its attracting charms. Situated on an eminence, Madison invites the lovers of beauty to view its rounded hills, its gentle slopes, its rippling streams, its stately groves, its flowry lawns, its flowing meadows; its waving corn, its extensive prospect, its green fields and its rich soil. Such a spot could not long remain the inheritance of lazy, untutored ignorance. The hand of active industry has taken possession of this lovely place, banishing thoughtless inactivity. The light of ac-

quired knowledge has banished savage ignorance, and the water that had wasted its power for ages, is now employed in driving as complete a flouring mill as can be seen any where, combining the most modern European improvements in mill machinery, acquired in a tour through Europe by the proprietor, Governor Farwell, with all the appliances of Yankee ingenuity. This being the seat of the State government, and of learning, and possessing so many local attractions, in point of health, beauty of scenery, facility of acquiring knowledge, and of intercourse, respectable families, wishing to lead a quiet, happy life and educate their children, will find it as desirable a place of residence as any perhaps, in the Union. It holds out inducements to hotel keepers, book sellers, and others carrying on genteel business, unequalled by any other town of its age in the country. The surrounding country affords farms for sale of unsurpassed fertility. Its population amounts to something between two and three thousand, and is rapidly increasing.*

In writing this short notice of the capitol of Wisconsin, I feel myself bound to acknowledge my obligation to the Governor for his hospitality and polite attention to me while remaining at Madison. Governor Farwell is a gentleman of sound judgment, great common sense, and extensive practical knowledge, acquired in business and in foreign countries, which his ample fortune enabled him to visit. He is a gentleman of good manner and prepossessing exterior, free from ostentatious display, but firm in the discharge of his executive duties, knowing no political party, and guided only by his own strict sense of justice. These qualities, combined with an untiring spirit of improvement which gives extensive employment to tradesmen and laborers, have gained

* Its present population is said to be between four and five thousand.

for him the approbation of the State and the general esteem of all those around him.

Kenosha, on Lake Michigan, is 35 miles south of Milwaukee, and 55 miles north from Chicago. It has a harbor which admits of improvement. Three newspapers are published here; and artesian wells sunk with success, which supply the town with a never failing supply of water. It has the advantage of a plank road, and will soon enjoy the advantage of two rail roads. There are good private schools and academies, in addition to two common schools, the building devoted to one being sufficient to accommodate 700 pupils, and that devoted to the other, 300. In 1851 it contained 3,360 inhabitants. The country west of this town is not inferior to any part of the State for agricultural purposes. Kenosha has good hotels and taverns.

Shéboygan is delightfully situated on the lake. It occupies a high position and commands a beautiful view of the lake. This town contains over 2000 inhabitants, has 7 fine churches, and 4 newspapers. It has the advantage of two plank roads, and must share in the advantages of rail roads, if the inhabitants are alive to their own interest. Its situation and harbor, with the vast extent of agricultural country west of it, ought to secure a large business. In 1850, 17,020 passengers landed at this port during the season of navigation, besides a considerable quantity of merchandize, miscellaneous goods, furniture and fruit. It has good hotels, taverns, common schools, and college, besides the usual mechanical shops.

Sheboygan Falls is 6 miles from the town of Sheboygan. It is built on both sides of Sheboygan river, and has a population of about 800, with 2 grist mills, 2 turning lathes, 4 hotels, 3 churches, a printing office, a foundry, &c. This

town has a good water power, and considering its size, does a good business.

Janesville is the county seat of Rock county, and is distant from Milwaukee about 65 miles, from Beloit 13, and from Madison 41. This town has a valuable water power, created by dams constructed across the river. The growth of this town has been very rapid. In 1843, it contained only 333 souls, and in 1853 it contained a population of 5000. A number of rail roads pass through this town, which will soon raise it to importance, and make it a point of considerable resort. It has 2 foundries, 1 mill for manufacturing water-lime, 1 oil mill, 1 woolen factory, 3 saw mills, 4 flouring mills, 4 newspapers, 6 churches, 3 banks, male and female academies, an institution for the blind, a mill for sawing stone and turning wood. It has also a large brewery and distillery, both in very high repute for the excellence of the beverages manufactured in them. These are the property of Mr. Bunster, who also has established a bank at Janesville, which is said to be conducted on liberal principles.

Watertown is the largest town in Jefferson county, occupying both sides of Rock river, near the Great Bend, at the foot of Johnson's Rapids, and possessing one of the best water-powers of the country, created by a dam built across the river. This water-power is employed to give motion to 3 grist mills, 4 saw mills, 1 oil mill. In this rising town are 1 fanning mill, 1 carding machine, 1 woolen and yarn factory, 2 select schools, 6 school houses, waggon and machine shops, hotels and taverns, banks, &c., and 4,000 inhabitants. This town will soon have its railroads, and has already its plank roads.

Waukesha lies between Watertown and Milwaukee, on the Pishtaka river. Its situation on the border of a rich

prairie, with the advantage of rail and plank roads, renders this a most desirable place to live in. It contains many handsome buildings, 4 hotels, 1 foundry, 6 churches, an academy, 1 machine shop, 1 grist mill, 1 saw mill, 1 carding mill, two newspapers. On a rising ground south of the town, stands the college, under the able superintendence of Dr. Savage, a gentleman whose manner is calculated to gain respect.

Fon du Lac is situated on the southern extremity of Lake Winnebago. The growth and prosperity of this town have been very rapid. It contains over 4,000 inhabitants, 9 good hotels, 3 banks, 2 planing mills, 3 newspapers, several churches, a good private school, several common schools, and the usual number of factories. Fon du Lac is celebrated for the number of its artesian wells and the purity of its water. All the boats on the lake visit this place. It only wants rail and plank roads to make it one of the best business points in Wisconsin.

Appleton has a paper mill, 2 grist mills, 5 saw mills, 1 edge-tool factory, 2 planing mills, 5 hotels, and water power not inferior to any part of the State. It has a population of 800. Its situation and university will ensure its progress.

Depeer is a village of about 1,200 inhabitants, on the Fox River, above Green Bay. It has 7 mills and 2 fisheries, yielding 1,500 barrels of fish annually.

Menasha is a town of considerable promise, having good water privileges and a population full of energy and spirit. This town is situated on the north side of Doty Island. It has 1,200 inhabitants, and the many advantages it possesses for a town, must ensure its rapid growth. It has 3 grist mills, 5 saw mills, 1 tub and pail facrory, sash and blind factories, an iron foundry, a brewery, chair and cabinet manufactories, a large pottery, 4 taverns.

Neenah is a town on the south side of Doty Island, and has all the advantages of Menasha for a town or city, and has about the same number of inhabitants. Its water power is almost unequaled. It has 3 grist mills, 2 saw mills, a foundry, a planing mill, a sash and blind factory, cabinet and smith shops, &c.

Grand Chute, above Appleton, has a good water power.

Beaver Dam, in Dodge county, is favorably situated, having the advantages of an extensive water power and railroad communication, with an excellent farming country around it. It has 2 flouring mills, an oil mill, a carding machine, saw mill, woolen factory, 3 hotels, and a population of 1,500. Our enterprising and excellent townsman, James Ludington, Esq., a young gentleman of good promise, is identified with the improvement and progress of this town, in which he has a considerable interest.

Horicon and Waupun are two villages likely to be improved by the railroad now in course of construction.

Whitewater, on the M. & M. Railroad, in Walworth county, is well located, and has a population of 1,100, with 2 grist-mills, saw-mill, iron foundry, a pottery, and two or three hotels.

Oshkosh, the county seat of Winnebago county, is a flourishing town, on the west side of Winnebago Lake. It has a population of near 3,000, with a soap and candle factory, 1 foundry, 1 tannery, 1 threshing machine factory, 6 mills, 6 hotels, 2 breweries, 1 pump factory, 2 sash factories, 3 newspaper, 1 academy, and common schools, steam power supplies that of water, in which the town is deficient. This is a good point and must progress.

Portage City is situated on an eminence connecting Fox and Wisconsin rivers, to which point they are both naviga-

ble. A canal has been recently constructed connecting both these noble rivers, and rendering the navigation uninterrupted from the Mississippi, to Green Bay, when the obstructions in the lower part of the Fox River shall be removed, which is expected to be done before the expiration of the present year, by which a water communication shall be established between this young city and ten thousand others, placed at various points, whose collective distances apart, give Portage City a navigable channel of 14 or 15,000 miles, securing accessible markets for the sale of the inexhaustable quantities of lumber which the northern pineries will annually supply. Being the stopping place, or half-way-house of an extensive navigable chain, along which must pass and repass innumerable vessels, laden with the produce of boundless regions, it is needless to say that its commercial advantages can scarcely be surpassed. What nature left undone to make Portage City a business point, art, in the progress of events, is accomplishing. The railroad chartered to pass through it will make it accessible from every quarter, thus securing the double advantage of land and water carriage, two agencies essential to the growth and prosperity of every city. With such advantages, its upward progress is certain. Its population is 2,000. It has hotels, newspapers, churches, factories, and every branch of trade that could be expected in so young a city.

Stevens' Point must become a place of some importance when the Horicon Railroad reaches it. Its agricultural capabilities and lumber resources will make it a good business point. It has already a population of 600 or 800.

The village of Baraboo is surrounded by a good farming country, and has a vast amount of water power, with iron ore in large quantities at various points. It should leave nothing

undone to get a railroad, which would be the means of opening up the resources of the district.

Prairie du Chien is on the bank of the Mississippi, and will be the terminus of the Milwaukee and Mississippi Railroad. It is now but a small village, but its situation must insure its growth and commercial importance.

La Crosse is a small village, on the Mississippi, containing about 600 inhabitants. It is to be the terminus of the La Crosse & Milwaukee Railroad. This site commands every advantage that can be desired for a large city, which, no doubt, it is destined to be at no very distant day.

Shullsburg is situated in La Fayette county. Its mineral resources are considerable, and it contains a population of 2,500, with 4 churches, 5 hotels, and the usual number of different mechanic's shops.

Mineral Point is a good town, lying in the southern part of Iowa county. The District Land Office is kept here. Being in the midst of a prosperous mineral district, and having a railroad communication with Chicago, it must always command business.

Dodgeville is a neat village, containing a population of about 2,000. It is surrounded by a mineral district, which is also capable of producing every variety of crops cultivated in the State.

The village of Platteville is delightfully situated near the mounds of that name. It contains 1,200 inhabitants, and is in the vicinity of good bodies of mineral.

Berlin, in Marquette county, is a promising village, situated on the Fox River. It contains between one and two thousand inhabitants, and is surrounded by some of the best farming country in the State. Berlin lies on the highway between Milwaukee and Lake Superior, to which place the

Milwaukee & Horicon Railroad is ultimately to extend by two routes, terminating at Ontonogon and Fon du Lac. This road and the Fox River are sufficient to confer on this point advantages calculated to raise it to some importance among the western towns.

Waupun lies 16 miles southwest of the city of Fon du Lac. It is surrounded by an excellent farming country, and has a population of over 500. The State Prison is located here, and the village will have all the advantages of the Milwaukee & Horicon Railroad, which passes through it.

Ripon is a village in Fon du Lac county, 22 miles west from the city of that name. The Milwaukee & Horicon Railroad passes through it, and a number of other roads, connecting towns of some importance. This town has an excellent water power which drives machinery. It has a Presbyterian college and a woolen factory, with hotels and churches.

Richland City is situated at the mouth of Pine Creek, in Richland county. Being on the Wisconsin river and surrounded by a good farming country, its future prospects are good. Its lumbering and mineral resources are additional inducements to settlers.

Richland village is built on Pine Creek. This is surrounded by good farming land and has good water power and mills.

Instructions to Emigrants.

Persons intending to come to America should form all their future plans of operation at home, on rational principles, founded on accurate information derived from some reliable source; as a stranger in this country can form no plan of his own, from the fact, that the moment he enters New York or Boston, he is thrown into a whirlpool of advising knaves, in

which he is tossed about, and ultimately swallowed up, having no power amidst such conflicting elements to steer his own course. The Irish emigrant encounters his first difficulty in Liverpool, where he is assailed at every corner and lane by one of those runners, so perfect in his calling, that he is sure to swindle the poor deluded Irishman out of a few shillings at least. Let the Irish avoid these as they would the plague. Let the emigrant go into some respectable office at once, and pay for his passage, if he had not done so before in one of the branch offices in Ireland. On his arrival in New York, he is sure to be welcomed to the land of liberty by shoals of monsters in human form, all vieing with each other in tendering advice, and doing some friendly service to the stranger. Let him not listen to these villains, but go at once to the Irish Emigration Society, where he will get proper advice and instruction how to act, and where to go in search of employment, land, or whatever he may require. The members of this society are Irishmen of respectability. There is at present an agent from the State of Wisconsin in New York, who will give advice to all strangers, whether Irish, German, Dutch, English or Norwegian. From the respectability of this agent, his advice should be received without hesitation.

When strangers, depending on wages for a livelihood, land in New York, or Boston, their best chance for employment is considerably increased by moving westward, which they can do at little cost, on account of the competition between boats and rail road cars leaving the seaboard towns. The prosperous state of the agricultural interest in Wisconsin, and the vast amount of rail road operations now going forward in every part of the State, have created a demand for labor which far exceeds the supply in the market.

When I commenced this article, I thought to give the dif

ferent routes to the west in detail; but the changes that take place every day, and the number of new routes that start up in quick succession, would render such a task useless. A volume written on this subject could scarcely secure the poor emigrant against fraud. His only chance is to go to the Irish Emigration Society, or to the Wisconsin Emigration Agent, and take his instructions from them. Trusting to the advice received at either of the above offices, the emigrant, in all his journey westward, must keep a sharp look out after his baggage. Let him keep clear of runners, among whom are many knaves whose only object is to cheat the unwary stranger. Among the runners, no doubt, are respectable persons, duly employed to look out for passengers, but a stranger cannot distinguish them from knaves who are not in the employment of any respectable company.

Emigrants coming to Wisconsin, or to any of the Western States, had better purchase a ticket in New York which will bring them all through by one or either of the great Central routes. The emigrant can travel all the way from NewYork to the west by water, which is by far the cheapest, but the most tedious and annoying, so much so indeed that few travel that way. Travelling by steam on the lakes is cheap, pleasant and safe; but on the canal it is both tedious and disagreeable. The emigrant should know that he could make his way to the west partly by rail road and partly by steam boat. This mixed mode of travelling may answer very well for some parties, while the quick route, all the way by rail road, may suit others. The choice is to depend on the quantity of baggage owned by the parties. The rail road is the quickest, and perhaps the best, when parties are not incumbered by much baggage; but in case of much weighty baggage, the mixed mode of travelling is the best and cheapest.

The emigrant will see the newspapers teeming with advertisements to suit every want. Many of these are from respectable persons who mean what they say, but more are the productions of knaves who try every artifice to induce strangers to give them a call. I have seen advertisements from persons who would appear to forget their own interest in their anxiety to serve their countrymen, but whose only object was to deceive. I have seen an advertisement stating that an individual had brought two hundred industrious families with him to this country, whom he settled down upon farms, when in reality he left his native land in disguise, dressed as a peasant. I have seen advertisements stating that the advertiser, as agent, had sent thousands of dollars to the old country, when the fact was notorious that this agent was trafficing upon these thousands all the time, instead of remitting them to their proper destination. Let the stranger beware of these snares. They are set for him in almost every town. On every side the stranger will see flashy placards, flaming advertisements, and artful runners, but let him not turn to the right or left to read them, till some friend has informed him of the character of the person who issues them. If the stranger wants to purchase land, let him go into some respectable land office, many of which are to be found in all our western towns, and he may rest assured of getting a good title, as no respectable land agent will compromise his character by deceiving the purchaser.

All the towns along the lake shore have respectable land offices, where persons in quest of farms can suit themselves. Having a general knowledge of all the towns and country parts of the State, I shall at all times be ready to advise strangers, and direct them to any place to which they m wish to go. Millers, iron founders, mechanics and labore

will always find me ready to direct them where water-power, mineral, or work may be had.

Persons coming from the old country have no business to incumber themselves with furniture, or indeed with baggage of any kind; as most things can be had here nearly as cheap as there, and some things cheaper. It is a mistake even to bring too much clothes. When the emigrant arrives at Milwaukee, or any town on the lake, he had better take lodgings at once, or go into some respectable, honest boarding-house, and then apply to some respectable land agent in town for a farm, which he can easily procure, of any size to suit his purpose.

Strangers coming to Wisconsin are not to be deceived by supposing that they can get land in any part they please at government price, ($1,25). Large bodies of government land, however, can be had in the north and north-west parts of the State, which may be bought for $1,25; and any amount of second hand land may be had in any part of the State at prices varying from $3 to $30, according to the improvement made, and the distance from market. These prices do not apply to land in the vicinity of Milwaukee, Racine, Janesville, Beloit, or Madison; or, perhaps, in the immediate vicinity of Sheboygan, Fond du Lac, Oshkosh, or Kenosha; but, as a general thing, excellent farming land can be had for the above prices. Strangers looking for a home ought to look more to location and proximity to market than to the first price. Such as may be desirous of purchasing government land must go to Menasha, Stevens' Point, Mineral Point or La Crosse, where the land offices are kept; but persons wanting improved farms, had better come to Milwaukee, which is the great emporium for the sale of land already located.

CHAPTER XIII.

When I commenced this work, I intended to give the Fauna and Flora of Wisconsin, but the press of professional business has prevented me from carrying my intention into execution. The use of the different sorts of woods in this State, however, is of such importance in industrial pursuits, that I feel bound to subjoin the common names of the principal species. I mean also, if time permit, to give the common names of all the animals hitherto observed in the State.

In this part of my work, I feel bound to express my obligation to Mr. Sercomb, curator of the State Museum, at Madison, for his kindness in furnishing me with a large list, made by himself, of the birds, beasts, fishes, reptiles, &c., of Wisconsin. My thanks are also due to Mr. Lapham, who has devoted much time and labor to the natural history and botany of the State. Dr. Hoy, of Racine, has contributed largely to perfect the Fauna and Flora of Wisconsin. Dr. Hoy is a gentleman well known for his researches in natural science.

Oaks—White Oak, Burr Oak, Swamp Oak, Post Oak, Swamp Chesnut Oak, Red Oak, Pin Oak.

Maples—Sugar Maple, Red Maple, Mountain Maple, Box Maple.

Elms—White Elm, Slippery Elm.

Cherry—Wild Black Cherry, Bird Cherry, Choke Cherry

Wild Plum—Hackberry, Basswood, White Thorn, Dotted Thorn, Crab Apple.

Ash—Mountain Ash, Ash (Fraxinus), White, Black Ash.

Walnut, Black Walnut, Butternut, Shell Bark Hickory, Pignut Hickory.

Beech—Red Beech, Water Beech, Iron wood.

Poplar—Balsam Poplar ; this tree is sometimes called Cotton Wood ; Balm of Gilead, &c.

Aspens—Quaking Aspens, Large Aspen.

Sycamore or Buttonwood, Canoe Birch, Kentucky Coffee Tree, June Berry.

Evergreens—White Pine, Red Pine, Yellow Pine, Shrub Pine, Balsam Fir, Double Spruce, Hemlock, Tamarack, White Cedar, Red Cedar.

These are the principal woods indigenous to the State ; others have been introduced for purposes ornamental and useful.

Common names of Animals found in Wisconsin.—For the classification and some of the names, I am indebted to Mr. Lapham and Mr. Sercomb :

Mammalia—Opossum, Hoary Bat, New York Bat, Little Brown Bat, Silver-haired Bat, Star-nose Mole, Common Shrew Mole, Dekay's Shrew, Foster's Shrew, Short-tailed Shrew, Black Bear, Racoon, Badger, Wolverine, Skunk, Fisher, Marten, Little Weasel, Ermine Weasel, Mink, Otter, Indian Dog, Common Wolf, Prairie Wolf, Red Fox, Grey Fox, Panther, Lynx, Wild Cat, Grey Squirrel, Fox Squirrel, Black Squirrel, Red Squirrel, Striped Squirrel, Flying Squirrel, Gophar, Line-tailed Squirrel, Woodchuck, Deer Mouse, Beaver, Muskrat, Porcupine, Brown Rat, (introduced,) Black Rat, (introduced,) Mouse, Jumping Mouse, Marsh Meadow

Mouse, Beaver Field Mouse, Yellow-cheeked Meadow Mouse, Pouched Rat, American Grey Rabbit, Rabbit, another species, Buffalo, Antelope, Deer, Moose, Elk, Reindeer, White Deer.

Among the animals found in Wisconsin are 62 Mammals, some of which have been banished by civilization beyond the Mississippi. The Buffalo has disappeared. The last seen east of the Mississippi was in 1832.

Birds found in Wisconsin.—Turkey Buzzard, Golden Eagle, Bald Eagle, Washington Eagle, American Fish Hawk, Duck Hawk, Pigeon Hawk, Sparrow Hawk, American Goshawk, Cooper's Hawk, Slate-colored Hawk, Mississippi Kite, Swallow-tailed Hawk, Rough-legged Falcon, Red-tailed Hawk, Common Buzzard, Broad-winged Buzzard, Winter Buzzard, Marsh Harrier, Hawk Owl, Snowy Owl, Screech Owl, Mottled Owl, Great Horned Owl, White-bellied Horned Owl, Great Grey Owl, Barred Owl, Long-eared Owl, Short-eared Owl, Acadian Owl, Kirtland's Owl, American Barn Owl, Whip-Poor-Will, Night Hawk, Purple Martin, Barn Swallow, Cliff Swallow, White-bellied Swallow, Bank Swallow, Chimney Swallow, King Fisher, Northern Butcher Bird, King Bird, Great-crested King Bird, Dusky Fly-Catcher, Wood Pewee, Phoebe Bird, Green-crested Fly-Catcher, Olive-sided King Bird, American Red Start, Hooded Warbler, Blue-grey Gnat-Catcher, Yellow-throated Greenlet, Solitary Greenlet, Warbling Greenlet, Red-eyed Greenlet, Yellow-breasted Chat, Common Mocking-bird, Brown Thrush, Cat Bird, Robin, Wood Thrush, Hermit Thrush, Wilson's Thrush, New York Water Thrush, Oven Bird, American Titlark, Myrtle Bird, Red-poll Warbler, Summer Yellow Bird, Spotted Warbler, Black-throated Green Warbler, Blackberrian Warbler, Kirtland's Warbler, Chesnut-sided Warbler, Black-poll

Warbler, Pine Warbler, Prairie Warbler, Spotted Canada Warbler, Kentucky Warbler, Blue-grey Warbler, Cape May Warbler, Yellow-throat Morning Warbler, Worm-eating Warbler, Golden-winged Warbler, Nashville Warbler, Orange-crowned Warbler, Tennessee Warbler, Varied-Creeping Warbler, House Wren, Winter Wren, Short-billed Wren, Marsh Wren, Mocking Wren, Ruby-crowned Kinglet, Gold-crested Kinglet, Blue Bird, Brown Creeper, White-breasted Nuthatch, Red-bellied Nuthatch, Black-cap Tit, Black-throated Waxwing, Cedar Bird, Horned Lark, White Snow Bird, Fox-colored Sparrow, Song Sparrow, White-throated Sparrow, White-crowned Sparrow, Yellow-winged Bunting, Field Bunting, Chip Bird, Savanna Bunting, Blue-striped Bunting, Snow Bird, Swamp Finch, Lesser Red-poll, Mealy Red-poll, Yellow Bird, Pine Finch, Black-throated Bunting, Indigo Bird, Ground Robin, Crested Purple Finch, American Cross-bill, White-winged Cross-bill, Cardinal Grosbeak, Rose-breasted Grosbeak, Evening Grosbeak, Black-winged Red-bird, Meadow Lark, Golden Oriole, Orchard Oriole, Bob-o'-link or Rice Bird, Cow Bunting, Yellow-headed Troopial, Red-winged Black-bird, Rusty Black-bird, Common Crow Black-bird, Blue Jay, Canada Jay, Magpie, Common Crow, Raven, Humming Bird, Crested Woodpecker, Downey Woodpecker, Yellow-bellied Woodpecker, Red-headed Woodpecker, Arctic Woodpecker, Golden-winged Woodpecker, Red-bellied Woodpecker, Yellow-billed Cuckoo, Blacked Cuckoo, Paraket, Wild Pigeon, Turtle Dove, Wild Turkey, Quail, Partridge, Spruce Grouse, Prairie Hen, Sharp-tailed Grouse, Willow Grouse, Florida Gallinule, American Coot, Meadow Hen, Mud Hen, Sora Rail, New York Rail, American Crane, Brown Sand-hill Crane, Great Blue Heron, Golden Heron, American Bittern, Small Bittern, Great White-crested Heron,

Blue Heron,Golden Plover, Spring Plover, Killdeer Plover,American Ring Plover,Whistling Plover,Turnstone,Black-breasted Sand Piper, Schintz's Sand Piper, Pectoral Sand Piper, Rough-breasted Sand Piper, Purple Sand Piper, Wilson's Sand Piper, Red-breasted Sand Piper, Semipalmated Sand Piper, Long-legged Sand Piper, Sanderling Willet, Varied Tatler, Yellow Legs Solitary Tatler, Spotted Sand Lark, Grey Plover, The Marlin, Ringtailed Marlin, Dowitchee,. Common American Snipe, American Woodcock, American Avoset, Long-billed Curlew, Jack Curlew, Esquimaux Curlew, Red Phalarope, Wild Goose,' Snow Goose, White-fronted Goose, Hutchinson's Goose, American Swan, Mallard, Black Duck, Grew Duck, Pin-tail Duck, American Widgeon, Blue-winged Teal, Green-winged Teal, Wood Duck, Ruddy Duck, Canvass Back,Red Head, Broad Bill, Bastard Broad Bill,Whistler, Buffle-headed Duck, Harlequin Duck, Old-wife, Buff-breasted Sheldrake, Red-breasted Sheldrake, Hoaded Sheldrake, Double-crested Cormorant, Cayenne Tern, Black Tern, Marsh Tern, Common Tern, Bonaparte's Gull, Three-toed Gull, Winter Gull, Common American Gull, Great Loon or Diver, Red-threated Loon, Red-necked Grebe, Horned Grebe, Dipper, Crested Grebe.

Notwithstanding the great number of birds of different species found in Wisconsin, a stranger passing through it sees but very few. Though I have travelled the State in every direction, yet I have seen very few birds of any description. Till I witnessed the collection at Madison, prepared by Mr. Sercomb, and saw his and Mr. Lapham's catalogue, I could scarcely be convinced that 287 different species of birds could be found in the State.

Reptiles.—Snapping Turtle, Painted Tortoise, Blanding's Tortoise, Banded Rattlesnake, Yellow Rattlesnake, Blac

Rattlesnake, Common Striped Snake, Black Water Snake, Green Grass Snake, Small Red-bellied Snake, Milk Snake, Ring-necked Snake, Marsh Frog, Wood Frog, Shad Frog, Violet Salamander, Banded Proteus.

There are in the State 19 different species of reptiles.

Fishes.—Sunfish, Sheephead, Yellow Perch, Mullet, Minnow, Muscallonge, Catfish, Pickerel, Lake Trout, Brook Trout, Whitefish, Garfish, Dogfish, Sturgeon—making in all 14 different species.

There are 90 Mollusks and 92 Fossils* known in Wisconsin. Time and space would not permit to give a list of them. Such as may be curious about information on such a subject may consult works on Geology, and a list of the Fauna and Flora of Wisconsin, prepared by Mr. Lapham for the journals of the State Agricultural Society. The same work contains a catalogue of the plants of Wisconsin, which number 949.

The habits and instinct of some of these animals are almost incredible. Before last winter I had never seen what is termed a muskrat's house. In the middle of October, in passing along the marsh in the vicinity of Milwaukee, I observed what appeared to me to be a cock of hay recently made, and upon making enquiry respecting the strange locality of the hay, I was told that it was a muskrat's house. In a few days I observed several hundreds of these houses erected all over the marsh. The weather was very fine at the time. This early preparation on the part of the thoughtful rat, was a sure indication of the approach of a severe winter. How the muskrat, in the midst of the most delightful weather that could be imagined, and so long before, could foretell the ap-

* In connection with the subject of fossils, it may not be out of place to mention that fragments of the bones of the Mastadon, and a few of the teeth of the Elephant were found last year in the lead regions of Wisconsin, which proves that these gigantic animals once roamed through this State.

proach of a winter unusually severe, is a problem of some difficulty for naturalists to solve. The muskrat was well aware of what was to come, and he prepared for it. The previous winters were very mild, and the thoughtful prophet saw no necessity of wasting time and labor in the erection of a house which the mildness of the winters rendered unnecessary.

The work being now drawing to a close, I deem it necessary to say a few words, by way of apology, on the manner in which it has been executed. A work embracing so many subjects relating to a new country, vast in extent and but recently explored, requires more time and consideration in its general arrangement than I could possibly devote to it. The object of the work being original in its conception, no similar one having been previously written in this country, I had to strike out a new course for myself, which must have rendered the task much more difficult, it being easier to follow a beaten track than to explore and locate a new one, free from objections and faults. For this reason, and the impossibility of sparing time from the numerous duties of my profession, the work which I present could not be expected to be free from faults. As an apology for any errors or oversights in the work, I may be permitted to state that I have written it during a few spare hours at night, fatigued both in body and mind, after the labors of the day. Press of business, likewise, precluded the possibility of attending to the correction of the press with that degree of care which is so necessary in a work going before the public. I am well aware that statistical tables and scientific discussions are not calculated to render a work popular; but without these it would be defective, and indeed, in a great measure, useless. The work having been written by piecemeal, at different distant

periods, and in a hurry, without any attempt at style, or time to revise, it may be possible that the progressive and continually varying state of the country might have caused some apparent discrepencies, which, perhaps, would be charged to the author, and not to the cause that produced them.

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ERRATA.

In line	13,	page	97,	for	develop	read	develope.
"	26,	"	45,	"	wil	"	will.
"	12,	"	48,	"	ever	"	never.
"	8,	"	62,	"	oven	"	oxen.
"	6,	"	64,	"	ow	"	low.
"	21,	"	77,	"	coals	"	coal.
"	13,	"	83,	"	mill	"	mills.
"	20,	"	87,	"	amoud,	"	amount.
"	9,	"	122,	"	effects,	"	effect.
"	16,	"	122,	"	influence	"	influences.
"	31,	"	122,	"	he	"	the.
"	3,	"	125,	"	show	"	shows.
"	9,	"	138,	"	manufacturer	"	manufacture.
"	1,	"	141,	"	farms	"	forms.
"	12,	"	146,	"	retterics	"	retteries.
"	2,	"	152,	"	we	"	are.
"	18,	"	154,	"	thich	"	thick.
"	30,	"	155,	"	gague	"	gangue.
"	26,	"	156,	"	zink	"	zinc.
"	14,	"	184,	"	former	"	farmer.
"	19,	"	204,	"	north-westerly	"	south-easterly.
"	25,	"	212,	"	blanks	"	six and five.
"	[illegible]	"	[illegible]	"	are	"	were.
"	15,	"	298,	"	distinguished	"	distinguishing.

DATE DUE
